ELECTRICAL REVIEW

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The printing situation has again obliged us to produce this issue of the "Electrical Review" in unusual form, with the exception of those pages normally printed outside London, but this week we have been able to include Classified Advertisements. Once more we ask our readers' indulgence.

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ELECTRICAL REVIEW

Vol. CXLVII No. 3799 15th September, 1950

THE OLDEST ELECTRICAL PAPER ESTABLISHED 1872

Power Factor

something more than system average needed

ARE the advantages of a good power factor realized as they ought to be, or, to put the question the other way round, are the disadvantages of a poor power factor fully realized?

There is, in general, still a great deal of misconception of this ratio of the true power (in watts) to the apparent power (in volt-amperes) which may be expressed in trigonometrical terms (if the current is sinusoidal) as being equal to the cosine of the angle by which a.c. lags behind, or leads, the voltage producing it. But we are not just now concerned with reconciliation of the abstract with the concrete, or exact definition, or even pseudo-magic terms.

The subject has been of academic interest from the beginning; its practical importance grew between the two wars and now seems to us to demand more definite attention because the cost of supplying a.c. depends upon the power factor at which it is distributed, while the problem of how to deliver increasing amounts of power over existing system networks is growing urgent.

It was stated recently that the close liaison and identity of interests between the British Electricity Authority and the Area Boards should ensure the maintenance of a satisfactory power factor, so the incorporation in the grid tariff of a low power factor penalty clause was unnecessary.

The B.E.P. Convention at Harrogate in June was told that this statement represented the considered opinion of both sides; it may be correct, though the evidence on which it is based has not been disclosed. If it is the average power factor at the generating stations which is meant, then it must be borne in mind that the value is the resultant after lag due to inductive load has been counteracted by lead due to capacitance in transmission lines. If it is true that this average is as high as 0.9 (though it is said to be falling) then it must be lower in some parts of the system.

In these days of cuts in capital expenditure, when the electricity supply industry is being accused of being a greedy devourer of our capital resources, it is the duty of all concerned to make the best possible use of the plant, cables, transformers and switchgear already installed. The current in an a.c. circuit varies inversely as the power factor and the heat loss in the conductors varies inversely as the square of the power factor. Wattless current flows between that part of the circuit in which there is inductance and that part in which there is capacitance. The necessity of restricting it to the smallest

possible part of the circuit is therefore obvious. It is not enough to have regard only for the overall result; individual installations must be watched.

The use of synchronous condensers does not appear to be general in this country. One sees advertisements inviting tenders for their installation in Dominion and foreign countries, but it must be seldom that large plant of this kind is pointed out during a tour of our factories.

It is profitable to both the supply authority and the consumer when the tariff is such as to induce the installation of apparatus for the improvement of power factor. The supplier thereby obtains the maximum use of the equipment on which capital has been expended; the consumer finds that the expense involved is soon repaid by the saving effected and that the saving continues. All this may sound obvious, but the fact is that without particular and specific inquiry, very little information is available; hence the question with which these comments opened.

CONTRACTORS' APPRENTICES

After thorough and lengthy discussions between the employers and the trade union in the electrical contracting industry an admirable apprenticeship scheme has been evolved for the industry and put into operation from the beginning of this month. The scheme, which will be administered by an Apprenticeship and Training Council set up by the Ministry of Works, stipulates a five-year apprenticeship normally not terminating before the age of 21; both "bound" and "unbound" apprentices are covered. Particular attention is paid to technical instruction. The scheme will put this important and highly skilled craft on a more regular basis and ensure a flow of properly qualified electricians into the industry - sufficient, we hope, to eliminate in time the type of man who discredits the industry and endangers the public.

WAGE RESTRAINT ARROGATED

Against the advice of the General Council, the Trades Union Congress voted on 7th September against continuing the policy of restraint in demanding higher wages. The vote was on a resolution moved by Mr. W.Stevens, general secretary of the Electrical Trades Union, who contended that the profits of industry (which should be limited by statute) were sufficient to meet higher wages without increasing prices. The Congress rejected a resolution calling for the ending of compulsory arbitration in industrial disputes. The General Council proposed that consideration of the question of equal pay for men and women should be referred back but a motion was carried calling upon the Government to implement the principle as a lead to other employers. It is not expected that the acceptance of the two wage resolutions will result in an immediate spate of demands for increases but it will no doubt have an influence upon negotiations already proceeding.

GREATER PRODUCTIVITY

It is common form among chairmen of electrical manufacturing concerns to mention increased turnover when they report to shareholders at the annual meetings. The increase has been particularly evident on the export side. All this appears to have been achieved with very small additions to the labour force; indeed it is very difficult to find extra hands in these days of full employment. Figures published in the August "Ministry of Labour Gazette" show that in the electrical machinery and electrical apparatus manufacturing branches the total number employed rose only from 514,100 to 515,300 between mid-1948 and June this year. The production of electricity, too, has shown a great advance in this period but in this case the number of employees is stated to have risen from 140,200 to 160,900.

ASH-TIPPING IN GLAMORGAN

Permission has been given to the British Electricity Authority by the Ministry of Town and Country Planning to dispose of ash from Llynfi power station over an area of 31 acres in the Cefn Ydfa Valley in mid-Glamorgan. A Ministry inquiry was held last June after the Penybont Rural Council had withheld permission. The Ministry says that the issue resolved itself into weighing the needs of industry against the full preservation of amenity. At present it had no doubt that precedence must be given to industrial needs.

Public Lighting Equipment

exhibits at the A.P.L.E. conference

In conjunction with the annual conference of the Association of Public Lighting Engineers at Bournemouth last week (18th to 22nd September) there will be an exhibition in the Town Hall of a wide range of modern street lighting equipment. There is also to be an outdoor display in Braidley Road near the Town Hall, of lamp columns, class "A" and "B" bollards, traffic signs and the latest types of motor wagons, extending ladders, etc.

Fluorescent fittings will be very much in evidence and new units on the stand of the General Electric Co., Ltd., will include a four-lamp vertical lantern and two-lamp models of the existing "Three-Eighty" lantern, one for 5 ft 80 W and the other for 2 ft 40 W lamps. The four-lamp fitting is particularly suitable for main thoroughfares or similar situations where it is required to harmonize with the surrounding architecture. It is arranged for post-top mounting with the four lamps inside a fluted "Perspex" enclosure, with aluminium top spinning and cast base. The company will also show a new sodium lantern which consists of a cast iron body with a glass reflector above the single 140 W lamp, and is arranged for top entry. This design provides an efficient and economical means of utilizing sodium lighting.

The "Sol-Etern" range of fluorescent fittings made by the Revo Electric Co., Ltd., which includes lanterns for two, three or four 5 ft 80 W lamps (group "A") is to be represented by the three-lamp model and this will be shown together with the "Baby Sol-Etern" which uses two 40 W or two 80 W lamps (group "B"). A new decorative lantern to be shown has been designed for two or four 2 ft 20 W or 2 ft 40 W lamps mounted nearly vertical.

An item of particular interest on the stand of the Brighton Lighting and Electrical Engineering Co., Ltd., will be the new "Upright" fluorescent lantern for group "B" lighting. It is arranged for top-of-column mounting, is conical in shape and accommodates either two or four 2 ft 40 W lamps. A new pole-top mounting lantern designed to take two 5 ft fluorescent lamps will also be shown, together with a series of "Blesco" street lanterns for group "A" and "B" lighting, for tungsten, sodium and mercury lamps. A new development is a complete series of flood projectors both for long-range and close-up floodlighting with all types of lamps which has been designed for the Festival of Britain outside illuminations.

Apart from two examples of the small "Wilton-Sieray" lantern (group "B") for two 2 ft 40 W fluorescent lamps, Siemens Electric Lamps & Supplies, Ltd., will have on view a new design of the "Wilton-Sieray" lantern for group "A" roads, which has provision for three 5 ft lamps; it can be supplied in modified form to accommodate either two or four lamps. A feature of this fitting is that some three-quarters of the weight, including control gear, is carried in the head of the lantern, which is recessed into the concrete pole and is thus supported by the pole and not by the cantilever.

With next year's Festival of Britain in mind Thorn Electrical Industries, Ltd., has arranged to display on its stand colour floodlighting of public buildings with fluorescent lamps. The central exhibit will be a miniature theatre by means of which an almost infinite range of colour floodlighting can be demonstrated against a cyclorama background simulating conditions from broad daylight through dusk to complete darkness. It incorporates the company's technique of fluorescent lamp dimmer control which has been successfully used in several theatres.

The wide range of equipment to be

displayed by Crompton Parkinson, Ltd., will include lanterns for sodium, mercury and tungsten filament lamps, as well as cables, lamp-control gear, time switches and cut-outs. An outstanding item will be the "Corona" lantern, which is available in two sizes for 45/60 W and 85/140 W sodium discharge lamps. Designed primarily for side entry, but with facilities for top entry, it comprises a silicon alloy top casting surmounting a hinged "Perspex" bowl with hermetically sealed refractor plates of the same material. Maximum utilization of light is ensured by an internal anodized aluminium reflector.

The British Thomson-Houston Co., Ltd., is to show a selection of "Mazda" street lighting apparatus including typical lanterns for use with tungsten, sodium vapour, mercury vapour and fluorescent lamps. Among the new items will be a fluorescent lantern for group "B" roads, which houses two 2 ft 40 W lamps, and four new floodlights, together with a mercury vapour lamp (MA/V), designed to operate horizontally without the use of magnetic arc control.

Among the new developments which Holophane, Ltd., will be showing is a cylindrical enclosed sodium reflector lantern, together with certain ornamental reflector units.

The Edison Swan Electric Co., Ltd., is exhibiting prototypes of a range of lanterns providing 21 different lantern/glassware combinations covering the field embraced by sodium, mercury discharge and tungsten lamps.

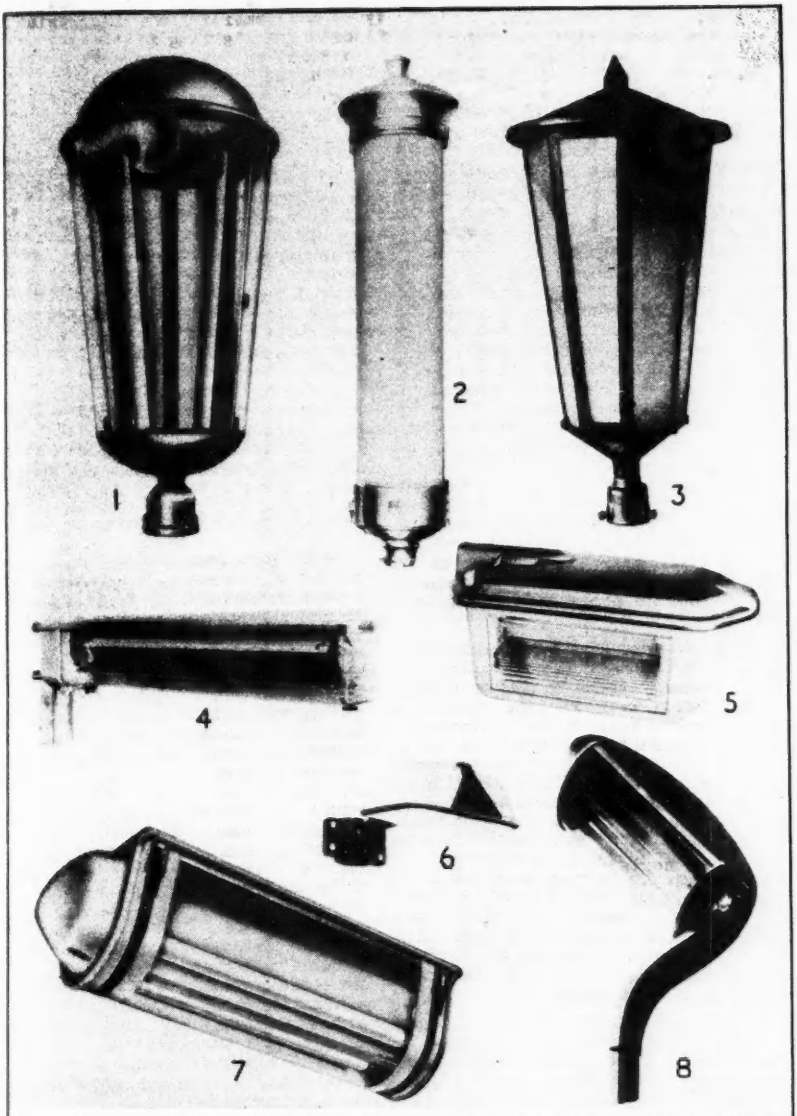
The main feature on the stand of Falk, Stadelmann & Co., Ltd., will be the "Fulmar" I and II lanterns for use with horizontally-burning sodium discharge lamps, for group "A" and "B" roads respectively. Each comprises a cast aluminium alloy canopy supporting a "Perspex" "U"-shaped cover panel to which refractor plates of the same material are hermetically sealed on the inside leaving a smooth surface on either side. This "frameless" design has the advantage of eliminating shadows on the roadway thrown by normal framed fittings. Other exhibits will include a range of group "A" and "B" lanterns for high pressure mercury discharge and tungsten filament lamps.

The exhibit of Philips Electrical, Ltd., will consist mainly of a selection of tungsten, fluorescent, blended, mercury and sodium lamps, together with several different types of commercial and industrial fluorescent lighting fittings.

In Braidley Road a selection of lighting columns of the latest design will be on view. They will include examples of the concrete type, such as those made by Concrete Utilities, Ltd., who can now supply a column occupying only 9.5 in across the pavement. The Stanton Ironworks Co., Ltd., will show eight spun concrete columns, four of which will have a mounting height of 25 ft, the others being for side street lighting. The Revo Electric Co., Ltd., will have examples of artificial stone, steel and cast iron columns and brackets. Tubular steel columns will be displayed by Stewarts and Lloyds, Ltd., and the "Adastra" range of galvanized sectional steel poles by Poles, Ltd. The main exhibit of Gowshall, Ltd., will comprise illuminated guardposts and the new "Signlight" units for externally illuminating all kinds of traffic signs.

Back in the exhibition hall a wide range of time switches for public lighting and similar applications will be displayed by Sangamo Weston, Ltd., Venner Time Switches, Ltd., the Horstmann Gear Co., Ltd., and the British, Foreign & Colonial Automatic Light Controlling Co., Ltd., and the Automatic Telephone & Electric Co., Ltd., will demonstrate its "Rythmatic" ripple control equipment.

A fluorescent fitting for group "B" roads to be shown privately by the Metropolitan-Vickers Electrical Co., Ltd., is the "Borough" lantern which uses two 2 ft lamps. The lantern framework comprises two cast silicon aluminium endplates held in line by a 16-gauge mild steel canopy and a 0.5 in diameter tie-rod. The endplate at the "road" end has a blown "Perspex" wiring cover attached which gives access to the mains terminal block. Auxiliary gear is contained in the body and the optical system, consisting of two polished and anodized aluminium reflectors, is protected by a clear "Perspex" cover held in position by four toggle clips. Another new lantern for group "B" roads will be shown in the form of the "S.S.5" which is designed for tungsten filament lamps.



1. "Bleeco" "Upright" fluorescent lantern for 2 ft 40 W lamps. 2. G.E.C. four-lamp vertical lantern. 3. Revo lantern for two or four 2 ft fluorescent lamps. 4. Siemens redesigned "Wilton-Sieray" lantern for group "A" roads. 5. Crompton Parkinson "Corona" lantern for 45/60 W or 85/140 W sodium lamps. 6. Gowshall "Signlight" for traffic signs. 7. Metrovick "Borough" lantern. 8. B.T.H. fluorescent lantern for group "B" roads.

VIEWS on the NEWS

By REFLECTOR

AWARDS of from 10s.0d. to £25 are offered by the South Western Electricity Board for ideas evolved by its employees which will increase efficiency of operation. It is stipulated that a suggestion which may be considered as part of an individual's normal job will not qualify him for an award, although it may improve his prospects of promotion. It seems, therefore, that most of the ideas will emanate from outside the department affected. On the principle that the onlooker sees most of the game this is probably in order, but it will naturally lead to many suggestions which are either impracticable or have already been tried and found to be not so good as they seemed. Still, there will doubtless be sufficient gold among the dross to make the scheme well worth while.

* * *

Speaking at the British Association meeting in Birmingham Mr.J.J. Gracie, general manager of the G.E.C. Witton Works, suggested that the present hours of work in industry were the upper limit; there was little likelihood of greater output resulting from longer hours. Indeed he visualized an eventual 20-hour week if war could be avoided and the standard of production improved sufficiently. I hope that concurrently with any reduction of hours successful attempts will be made to educate people to use their leisure to their own advantage and to that of the community. Otherwise the effects of idleness and boredom might be disastrous.

* * *

An article published in "Southern Electricity" shows that a tremendous effort was put into the "electrification" of this year's Royal Show at Oxford by the Southern Electricity Board. Work began in January and it involved the erection of three substations (one 1,000 kVA and two 500 kVA - 11 kV/230-415 V) and the laying of 2,050 yd of 11 kV and 4,990 yd of l.v. cable. The maximum demand reached 1,205 kW and a total of 108,539kWh was consumed. Over half of the consumption was in the ten cafés and restaurants which had a connected load of 833 kW; the cooking equipment was lent to the Royal Agricultural Society by the British Electrical Development Association. The Southern Board also collaborated with E.D.A. in the very fine "Electricity Farm" exhibit which was one of the principal attractions of the Show. I trust that the bread cast upon the waters by the Board will return to it after not too many days

* * *

In the same magazine there is an account of a strange experience of a mains department man who was digging a hole for a pole. He was approached by a lady from a near-by house who said "What a nice hole. Will you bury my husband in it ?" Treating this as a joke, the digger said he would. Thereupon the lady departed, returning shortly with a casket. This, she said, contained her late husband's ashes which she had kept for twelve months - long enough she thought. Although somewhat taken aback, the mains man carried out his undertaking (the right word) and deposited the casket in the hole where it now rests.

* * *

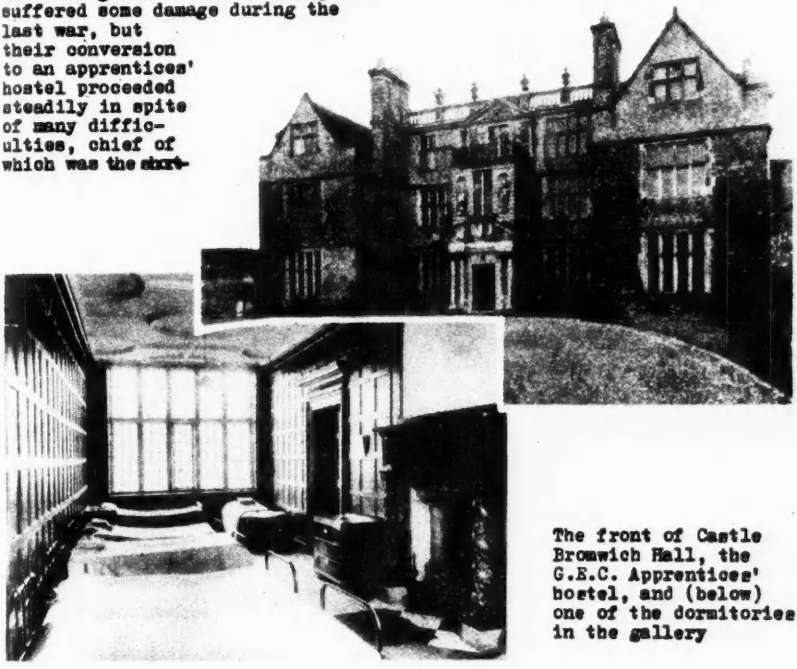
It has been said in France that one must suffer to be beautiful, but it is dreadful to think that electricity must be blamed for an excess of suffering. At Abertillery the other day a member of the Town Council said that during a recent electricity stoppage a woman undergoing a "perm" had to be taken, complete with chair and other apparatus peculiar to the operation, in a van to another part of the town where the supply was normal. Presumably nobody thought of running out an extension to her.

G.E.C. Apprentices' Hostel

FOR some years the General Electric Co., Ltd., has provided complete training schemes which enable students to apply the basic knowledge gained at schools and universities to practical industrial problems of today. The housing of these students has presented the company with a major problem. To meet this difficulty the G.E.C. acquired four years ago from Viscount Newport a lease of Castle Bromwich Hall with eleven acres of ground. The buildings had suffered some damage during the last war, but their conversion to an apprentices' hostel proceeded steadily in spite of many difficulties, chief of which was the shortage of labour and materials. Towards the end of 1948 the hostel was opened and today seventy of the company's apprentices are in residence.

Without detracting from the background of old world splendour, new amenities have been installed such as kitchens with the latest electrical equipment, newly equipped bathrooms, modernized dormitories, dining room, study room and lounge, providing normal boarding facilities, in addition to the provisions for study, leisure, sports, social functions and hobbies. As a measure of safety, there is a fully trained fire squad, formed by apprentices themselves under the supervision of a qualified fire officer, with its own fire station and appliances.

All apprentices who are normally resident outside Birmingham, are accommodated in the hostel for the first twelve months of their apprenticeship. They then move to other accommodation, usually found by the company, in order to make room for newcomers. The hostel is in the charge of the Education and Training Officer who resides at the Hall and has a committee, elected by the students to assist in maintaining discipline. Reports on the progress of all apprentices are regularly sent to their parents.



The front of Castle Bromwich Hall, the G.E.C. Apprentices' hostel, and (below) one of the dormitories in the gallery

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Underground Rural Distribution

NOT all the preservation societies, no matter how strongly they may urge underground distribution in places of outstanding natural beauty, are oblivious to the realities of the situation. The conclusion to which you came in your editorial note - that the extra capital cost of providing underground distribution in such areas should be borne nationally - is that which this society (as you acknowledge) has been advocating for some time past.

It is the clear intention of the Electricity Act, 1947, that "pooling" between the various Area Boards should take place. Section 36 (1) lays down:- ". . .the duty of the Central Authority . . . so to perform their functions . . . as to secure that the combined revenues of the Central Authority and all the Area Boards taken together are not less than sufficient to meet their combined outgoings . . . taking one year with another". But the spokesmen of the Area Boards, and some in even higher spheres, have shown great reluctance to acknowledge this principle and clearly, if - as seems to be the case - not only each Area, but still more each individual Sub-Area, is expected to balance its budget and show profit on its undertaking, the definite provisions of the Act will be set at naught.

That there is nothing inherently unreasonable in the request that supply lines in particular areas should be laid underground, is shown by the very considerable mileage of existing underground rural lines which have in the past presumably, operated successfully. In the whole of the rural area surrounding Lancaster the supply is by underground cable. And the engineer who had charge of the undertaking for many years, defended, and still defends, his policy on the grounds that, although initially more costly, the great saving in maintenance enables the undertaking to be operated profitably. In the southern part of the Lake District underground distribution, both high and low voltage, was the rule until very recently.

It is in the highest degree ironical that what was commercially possible in the bad old days of private enterprise should have become impossibly expensive now that the private company has been succeeded by the State's might and majesty.

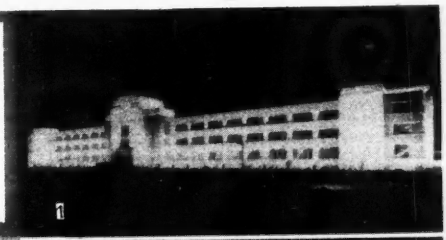
Ulverston, Lancs.

Philip Cleave,
Secretary,
Friends of the Lake District.

Some Recent Lighting Installations (See opposite page)

1. Floodlighting of W.D. & H.O. Wills' tobacco factory at Newcastle-on-Tyne (General Electric Co. Ltd.). 2. Fluorescent lighting in the weaving shed of the Stonebridge Cotton Manufacturing Co. Ltd.(Metropolitan-Vickers Electrical Co. Ltd.). 3. The West Midlands Gas Board's Northfield & Sutton Coldfield Branch lit by fluorescent fittings (Falk, Stadelmann & Co., Ltd) 4. Departmental store of Z. Dudley, Ltd., Kingsland, E.8., with "Mazda" fluorescent fittings (British Thomson-Houston Co., Ltd.). 5. Fluorescent lighting in the lecture theatre of St. John's Hospital, Lewisham (Thorn Electrical Industries, Ltd.). 6. "Trufolite" fittings installed at the Albion Mills of the Parkland Manufacturing Co., Bradford (Revo Electric Co. Ltd.). 7. "Flurolier" reflectors in the racking room of the Hounslow Model Laundry, Ltd. (Benjamin Electric, Ltd.).

Examples of Modern Lighting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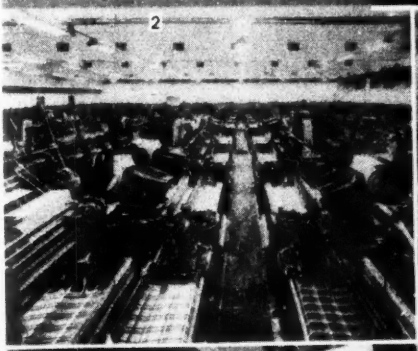
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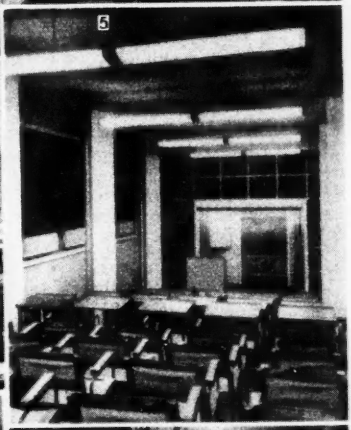
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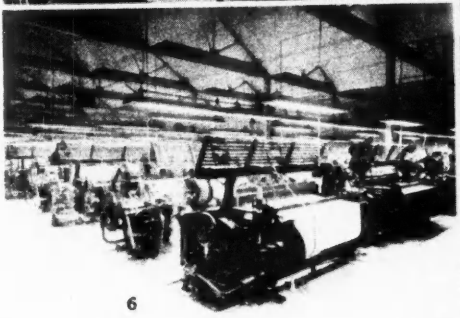
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SOUTH AFRICAN DEVELOPMENT

Orders for United Kingdom

FURTHER details relating to the South African Electricity Supply Commission's £54 million development programme were given on 6th September by Mr. A.M.Jacobs, chairman of the Commission. Outlining the reasons for the scheme, Mr. Jacobs stated that the provision of new plant had had to be curtailed during the war owing to the somewhat isolated position of South Africa which made it difficult (through demands on shipping, enemy activities and the United Kingdom's own more urgent requirements) to get equipment ordered from the U.K. During the war, too, South Africa was not affected so much as other countries nearer the scene of action and the normal increase in demand for electricity proceeded.

It was not, therefore, until after the war that the country could get down to preparing a development programme. With devaluation in September, 1949, there was an immediate increase in the price of gold and this had had an effect on gold mining. Adding to this the fact that new mines were discovered in the Orange Free State, it was necessary, in addition, to cater for new demands in the gold industry. Other industries too, including agriculture, had stepped up their demands. The programme was, therefore, based on demands that would be reasonably realized and there was no undue commercial risk.

The development scheme was commenced about two years ago and the bulk of the programme was expected to be completed by the end of 1955. Not all the £54, 000, 000 would, of course, be spent overseas. Some of the money would be needed for site preparation, foundations, locally manufactured steelwork, freight charges, etc, but a very large proportion of the money - at least 50 or 60 per cent - would be spent in the United Kingdom and practically all commitments for supplying plant were with this country.

Coal in South Africa was good, plentiful and cheap (in some cases under 4s per short ton) so that there was every inducement to use steam plant in preference to hydro-electric. For some time the Commission had followed the policy of siting power stations near to pit-heads where possible.

The increase in the time necessary to get a new power station into service, from about three to five years, made it necessary to order plant long in advance of requirements and had caused the Commission to spread its orders among manufacturers.

INTERLINKING IN EUROPE

Report of "Tecaid" Mission

EARLY in 1949, by arrangement with the Organization for European Economic Co-operation (O.E.C.C.) a mission of twenty-five engineers under the chairmanship of Mr. G.R. Peterson (overseas liaison engineer, B.E.A.), representing nine countries in Europe, travelled more than 4,000 miles in the United States investigating the manner and extent of system interconnection there for ensuring the best use of the maximum output of existing power generating plant. The object of this "Tecaid" mission was to see whether American methods could be applied to power systems in Western European countries.

The recommendations of the mission are that its findings should be distributed as widely as possible; that discussion of possible interchanges of electricity within and between countries in Europe should be left to free negotiation between the undertakings concerned, aided by large scale surveys to be prepared by appropriate organizations.

Regional committees of operating engineers should be constituted between neighbouring countries to discuss regular and temporary interchanges of power with and without formal contracts. Should currency difficulties hamper proposed power exchanges, then the intervention of the O.E.E.C. would be helpful. The exchange of ideas and experiences should be encouraged, preferably by a technical association of producers and distributors (e.g., U.N.I.P.E.D.E. - "Electrical Review", 28th July, 1950).

The report of the mission, entitled "Structure of Interconnections in the U.S.A. and Western Europe", is obtainable from H.M. Stationery Office, P.O. Box 569, London, S.E.1.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced by British Insulated Callender's Construction Co., Ltd., that Mr.G.P.Goodman, M.I.E.E., has been appointed an engineer in the Traction Contracts Branch. Mr.Goodman had his early training with Standard Telephones & Cables, Ltd., and joined the Electrical Department of the Demolition & Construction Co., Ltd., in 1936, as assistant resident engineer on that company's tramway to trolley-bus conversion contracts for the London Passenger Transport Board. In 1941 he joined Clough, Smith & Co., Ltd., and since 1945 has been their area engineer in the Midlands and North of England.

In our last issue we referred to the appointments of Mr.H.de C.Palle to the board of Aberdare Cables,

Mr.H.de C.Palle Mr.R.H.Cooke

Ltd., and Mr.R.H.Cooke as assistant manager of the X-ray Department of Philips Electrical, Ltd. We now reproduce their portraits herewith.

Messrs.J.Diamond, E.S.Watkins and V.B.J.Seely have resigned from the board of Scophony Baird,Ltd. Lt.-Gen. Sir Charles J.S.King and Mr. J.F.C.Dugdale have joined the reconstructed board and Sir Charles has been elected chairman.

Miss Phyllis Thompson, press officer of the E.A.W.and sub-editor of the "Electrical Age", has just obtained a B.A.(Hons.) degree in English at London University.Miss Thompson studied in the evenings at Birkbeck College while carrying on her work at the E.A.W.

Mr. D.E. Graham,general sales manager, Overseas Division, Crompton Parkinson, Ltd.,has been co-opted to the board of executive directors of that company for a period of one year beginning on 1st October.Mr.Graham joined P.&A.Parkinson, Ltd.,Guiley in 1925 as a sales engineer and subsequently represented the company in New Zealand. With the formation of Crompton Parkinson Ltd., in 1927, he went to Malaya and was responsible for many installation contracts. He returned to England in 1933 and after a period in the Manchester branch he again went abroad to India. Later he worked in Birmingham and became branch manager in 1938. During the war Mr. Graham was concerned with the cartridge factory operated by Crompton Parkinson, Ltd., at Doncaster, and was then appointed manager of the Machine Department, Chelmsford. In 1945 he became manager of the Overseas Division.

Mr. D.E.Graham

There were forty-eight competitors in the area finals of the Electrical Industries Benevolent Association (Merseyside & North Wales Centre) golf tournament played at Heswall, on 30th August. As a result of this tournament and other money-raising efforts, about £340 has been subscribed to the E.I.B.A. Winner of the main trophy, the Britton bowl and replica, was Mr.J.W.Trimble (Merseyside and North Wales E.B.) the runner up being Mr. J.Davies of Garston (electrical

contractor). In class B (handicaps of 14 and over), winners were Mr.D. Farmer (Glover's Cables) and Mr.W.A. Rawlinson (A.T. & E.Co.). Lowest scratch score, Mr.R.S.Owen(Henley's). Greensome Competition, Mr.J.D.Whitehead (A.T.& E.Co.) and Mr.G.Fish (B.I.C.C.) won on second nine holes from Mr.J.Vickers (McGoff & Vickers) and Mr.R.C.Kelly (B.I.C.C.). Mr.J. Eccles, chairman of Merseyside and North Wales E.I.B.A. Committee presided at the prize distribution ceremony.

Many members of the staff of the British Central Electrical Co., Ltd., recently visited Brighton for their staff outing and had an enjoyable day despite inclement weather.

OBITUARY

Mr.L.F.Burgess.- The death, on 25th June last, is reported by "Erda" of Mr.L.F.Burgess, managing director of Australian General Electric Pty. Mr.Burgess was born in Adelaide University, graduating as B.Sc. He received his training with the British Westinghouse Co., and after service with the Australian forces in the 1914-18 war (winning the M.C.) he joined the Westinghouse Co's.successors and became a director of Metropolitan-Vickers Australia Pty. which was later amalgamated with other concerns to form the Australian General Electric Pty. He was made general manager and director of the company in 1947. later being styled managing director.

Mr.G.P.Chase,manager of the London office of the British Vacuum Cleaner & Engineering Co., Ltd., who was with the company for 25 years, died on 1st September.

Mr.E.A.Hildick, export manager of the Midland Electric Manufacturing Co., met with a fatal motoring accident on 5th September. He had been with the M.E.M. Company for twenty-one years in charge of the Export and Transport Departments.

WILLS

Mr.E.V.Cheney, district engineer, Construction Department, B.T.H.Co., Ltd., died on 8th June last, leaving £6.839 gross, (£6,250 net).

Major G.McAlpine, M.I.E.E., technical adviser, Kelvin, Bottomley & Baird, Ltd., who died on 28th April last. left £1,265 gross (£1,217 net).

RECORDING TRANSIENTS

In a recently published report, reference U/T115,of the British Electrical and Allied Industries Research Association Dr.-Ing. R.E. Bauer and W.Nethercot, M.A.,B.Sc., F.Inst.P., described a new oscillograph for the recording of very fast electrical transients. In this instrument the hard valve time sweep is triggered from the transient with a delay time of a few hundredths of a microsecond. Its sweep range is from about 0.05 microsec to 2.0 millisec. The instrument includes timing calibrations from 10 kc/s to 100 Mc/s; deflection/voltage calibration in steps of 50 V up to 500V; and a range of potential dividers for impulses up to 25 kV peak.

With a 10 kV cathode ray tube and a F/1.0 lens, writing speeds of up to 20,000 km/sec can be recorded as single transients. With the fastest time sweep a temporal result of 10^{-9} sec is attainable. The development of this instrument was sponsored by the Fighting Vehicles Design Establishment and the Ministry of Supply.

Copies of the report can be obtained from the Association at Thorncroft Manor, Dorking Road, Leatherhead, Surrey, price 7s.6d. (postage 3d.).

Electrical Artists and Craftsmen

A National Exhibition of Arts and Crafts by members of the electricity supply industry is to be held in the Old Horticultural Hall, Vincent Square, London, for four days next February. In addition to selected exhibits, the display will include all the prize-winning items at local exhibitions held during this year in the Sub-Areas and Districts of the Electricity Boards and by the Generating Divisions of the Central Authority. These local exhibitions in the London Sub-Areas are being held this week and will be followed by a London exhibition to be opened in the Old Horticultural Hall on 4th November.

Classes of exhibits to be included will comprise paintings, water colours, etc.; photography; models; needlework, dressmaking and leather work; woodwork, metalwork and toys; and a special children's section.

Electrical Contracting:

Organization and Routine

by H. R. Taunton, A.M.I.E.E.

13-Orders (outwards) and advices

THE preliminary to the supply of material, in all but exceptional cases, is a requisition either from the foreman on a job or from the office. And requisitioning must be systematized not scattered casually in foremen's reports. Apart from the chance of their being overlooked, that means the trouble of extracting them for the storekeeper.

Special forms, in octavo books, should be provided for the purpose. The cost is negligible, the convenience to everybody obvious. The original, briefly headed, should have spaces for day-sheet number, date and foreman's signature. An address is not necessary, as the storekeeper should know from the day-sheet number where to send the goods. A margin should be ruled down the left of the sheet, "for office use only." The duplicates need not be printed. The engineering staff will have one or more of these books, and every foreman or man responsible for a job will be given one as part of his initial equipment.

The Storekeeper's Part

Requisitions when filled in will be handed in to the stores or posted to the office. In the latter case the engineer responsible will write out orders for any special items obviously not in stock, noting in the margin the order numbers. The requisition is then sent down to the stores and the procedure is then the same for it as for others handed in there. The storekeeper will note in the margin against any item he can supply from stock the letter "S". If there remain any items not dealt with, the requisition will be returned to the office where, finally the necessary orders will be written and noted on it. It can now be crossed through as completed. When the job is cleared it can be got rid of. It has no real value for reference, as its details are repeated elsewhere.

It should not be necessary to stress the importance of putting into writing every order for material, however small; but even in firms that have an efficient business organization neglect of it is not an unheard-of thing. In those that have not, it is a common one. It is so easy to ring up "So-and-so" for something wanted in a violent hurry, and, satisfied to hear it is being sent off, to dismiss it from memory. Not only every verbal or telephoned order, but those given in writing as part of a letter must be confirmed on an official form. If costing is done from the orders, as it should be, and not from invoices (except for values) orders written in casual correspondence have as little chance of being booked as if they had been given verbally.

Make-up of Order Books

Order forms are of all shapes and sizes: some a puzzle of stage directions, others simple to the point of blankness. Quarto size is rather wasteful; octavo plus the depth of the firm's heading gives a good average allowance of writing space. Books are usually made up of 500 pages and duplicates, with an alphabetical index; and two forms to the page will give the convenience of a round 1,000 to the book, the serial numbers in each prefixed by a different index letter. Where several order books are in use simultaneously this helps to identify the source of any particular order quoted. The counterfoils should not be flimsy, as they commonly are. If

one must be, to save bulk, it should rather be the original. It is the counterfoil that has to stand the constant rough handling.

The original will, of course, have the firm's usual heading, and spaces for date, the addressee's name, and the usual caption, "Please supply." At the foot a space should be provided for (alternative) delivery instructions; and another for signature completes the essentials of the form.

Counterfoils are blank, but advantage can be taken of the space left unused at the back of the head of the original, to print provision for various checking references: the name of the job and day-sheet number, the order-advice-note number, and the dates of the makers' advice-note and invoice. These references on the counterfoil are necessary in any case, although some of them may be obtainable in other ways. The printing of spaces for them ensures that they will not be overlooked, and it makes for neatness and method.

In a firm of any size it is desirable to keep several order books in use at once. The ultimate stationery bill will be the same, while it saves chasing a single book all over the premises. A separate book for orders on "Stores" means two books at least. If the firm buys most of its standard material from one wholesaler, a third book may be used. And if the storekeeper is authorised to write certain orders, he should have his own set, doubling the number in use.

Authority for Ordering

Who is to write, or rather, to sign the orders? In principle only one person in the firm should have authority to do so - the manager or other responsible man - if errors and omissions, not to say frauds, are to be avoided. A strict rule should be made on the point. Blank or unsigned counterfoils should be suspect. Employees will sometimes take an order form to secure something for themselves at trade prices, and though they may pay cash for it, it is, unsanctioned, a reprehensible practice. As already suggested, an exception to the rule can be made in the case of the storekeeper, with a limit of value. In most firms it is almost a necessity. The storekeeper comes to his work when the men commence theirs and may be needing material. It would be an obvious handicap if they had to wait about until a principal came an hour or so later to sign an order for it.

In writing out an order, makers' catalogue numbers and prices should be given where possible. It is little trouble to the man who is writing out the order, and saves a lot to the accountant in checking it on the subsequent invoice.

If a special time is quoted for delivery it should be confirmed on the order, which should be "followed up" for prompt delivery. Where there is reason to expect that delivery may be made in more than one consignment, it is well to write out two or more orders; and material for different jobs should never be ordered on the same form. An extra order costs less than the extra time lost in complicated checking.

The next phase in the history of an order is the delivery of the goods ordered, accompanied by an advice which must immediately be checked against the goods, for breakages and shortages, and against the order for any discrepancies. In the case of material delivered direct to a job, the first part of this check is the responsibility of the foreman, who must at once inform the office if any claim has to be made. In such cases the difficulty commonly arises that suppliers may send an advice with the goods, but none to the office; or, worse, send it to the office only. In this case the foreman should be promptly advised by a copy of it on a proper advice-note (outwards) form. Sometimes, however - for machinery, batteries, etc.- the makers' advice-notes are detailed documents, embodying unpacking or erection instructions, and it is then simpler to forward them direct to the foreman.

Except when the supplier's advice goes to the job with the goods - and even then it is perhaps better- an advice-note should be written out to cover each delivery, particularly of goods sent to jobs from stores, and of supplies - from any source - delivered to customers.

Form of Advice-Notes

Advice-note books can be similar in make-up to the order books, but it is as well to use a differently tinted paper and a distinctive colour for the usual heading and provision for date and consignee's

name and the words "Please receive." At the foot, in addition to the delivery details, two further references are necessary. One is to the consignee's order: either the foreman's requisition, a customer's letter, or perhaps an estimate to him and its acceptance. The other necessary reference is a description of the packing, with an identification number. If it is returnable, its value may be noted here. If it is not, the usual clause that "packing will be credited if returned, etc." should be cancelled.

Other clauses may be printed which experience dictates as advisable. One is that goods shall be examined immediately on receipt, so that a claim on the carriers can be made within three days in case of damage or loss in transit. Counterfoils will be blank. The space behind the heading can be used for the name or day-sheet number of the job if this is not otherwise clear, but no other reference is needed as advice-notes are used neither for costing nor accounting.

Credit Advice-Notes

In addition to the two advice-note books already mentioned - call them "O" for customers' supplies and "A" for general use another is necessary for advising suppliers of the return of goods for credit. It can be labelled "C" and otherwise can be identical with the others. In use the words "Please receive" must be followed by "and credit," rubber-stamped. It can also be used for advising claims against suppliers, such as for shortages and for recording returns from jobs, either to stores or for transfer to another job. The space for the consignee's name will in such case be filled in with either "Stores" or the name of the job to which the material is transferred, the name of the job sending it being noted on the counterfoil.

The counterfoils of the credit advice-notes are the one source from which the costing clerk obtains the data for all credit entries in the cost ledger, just as those of the order book are the one source for all debit entries - disregarding for the moment petty cash purchases. It is, therefore, necessary to provide special references on the credit advice-note counterfoils, to assist and ensure accuracy in posting from them. One way would be to have them specially printed; but the ordinary advice-note books can be adapted by means of a rubber stamp on the blank upper part of the counterfoil. This should provide spaces for the name of the job, day-sheet number, date of credit note (when one is due) and the cost ledger folio.

Material for work in progress is often entered to the various cost ledger accounts direct from the invoices before they are posted to the bought day book and finally filed. But it is much better to enter the items from the order book pricing them later when invoiced. It is true that entails two operations to complete the entry, but it has the great advantage of keeping the costs up to date. If material is posted to costs from the invoices only, a false idea of the liability on any contract at a particular date may be obtained, because some hundreds of pounds' worth of stuff ordered for it or actually delivered to it may not have been invoiced.

Again if orders are entered in the costs direct from credit advice-notes a valuable check is provided on the supplier. He is apt to be even more dilatory with his credit notes than with his invoices, and the fact that a costs account cannot be closed with an unpriced credit item left in it makes it certain that his memory will be jogged.

The method has the slight drawback that after the cost ledger entry has been made the order, and occasionally the credit advice, may be altered or even cancelled. But it is really of little moment. It is the prices that matter, and they can be filled in only from an invoice (or credit note), except in the case of material from stock.

The counterfoils of orders will have been cancelled by a diagonal when the goods were dispatched. When stores orders are entered to the cost ledger and priced, and when ordinary orders are invoiced, the counterfoils should be completely cancelled by a second diagonal. This system affords a time-saving index to the state of orders. Unmarked, they have not been dealt with. A single diagonal, they have been delivered (or returns have been credited). A complete cross, they are finished with.

CONTRACTORS' APPRENTICES

Particulars of New Scheme

MEMBERS of the National Federated Electrical Association (one of the bodies allied to the Electrical Contractors' Association) have now received particulars of the apprenticeship scheme agreed between the N.F.E.A and the Electrical Trades Union which came into operation on 1st September.

To administer the scheme the Ministry of Works is to set up an Apprenticeship & Training Council with an independent chairman. From 1st September all youths becoming apprentices to the craft of journeyman electrician will be registered though the Council. There will be two classes: Category I consisting of youths legally bound under a deed of apprenticeship; and Category II covering youths engaged upon the understanding that they will be retained by the employer for the full period if they are industrious and of good conduct. The latter will be given the same facilities as Category 1 apprentices but their engagements will be terminable at any time subject to the usual notice.

Normally the period of apprenticeship will be five years and will not terminate before the age of 21 but there are certain exceptions. There will be a short probationary period (maximum three months). The agreement provides for technical instruction, compulsory up to the age of 18 and continuing thereafter where it is deemed that the apprentice will benefit. Employers will grant facilities for this instruction and pay the fees. The National Joint Industrial Council for the industry will arrange for supervision of training.

A scale of wages is included in the agreement. The rates range from 12 per cent of the basic rate, plus 33⅓ per cent of any addition payable to journeymen, for apprentices aged 15, to 60 per cent of the basic rate, plus 66⅔ per cent of additions for those aged 20.

Other points covered by the agreement are annual holidays and further education. Certificates of training will be issued by the Apprenticeship Council upon completion of an approved apprenticeship. The scheme applies only to England and Wales.

Provisions are made for dealing with youths apprenticed before the coming into operation of the scheme.

PLASTIC COVERED WIRE

Control During Manufacture

A DIFFICULT problem of continuous measurement and control which arises in the manufacture of plastic covered wire has recently been solved by the Electronics Section of the National Physical Laboratory.

Ideally, the over-all diameter of the wire should be constant, but it is liable to vary because of changes in the extrusion rate. It is possible to control the diameter by varying the speed at which the wire is drawn through the die, but this requires continuous measurement of the diameter under difficult conditions.

Moving at speeds of up to 4,000 ft/min, the wire passes through a water tank immediately after extrusion to cool the plastic coating and then through a squeegee to remove the water. A certain amount of water, however, is carried along with the wire and splashed on to any measuring device, which must necessarily be placed after the tank where the coating is partly set. Even at this stage, the material can be easily deformed, so the pressure exerted by any measuring device must be limited to a few grams.

The N.P.L. instrument is based on an electronic micrometer. The wire passes between two rollers, one fixed and the other free, and its movement is linked mechanically to a quartz crystal oscillator. Any change of diameter in the wire produces a change in frequency of the oscillator signal, which is converted into a direct current proportional to the diameter. This current is used to control the speed of the motor drawing the wire, so the diameter can be kept within the specified tolerance.

While the method is capable of measuring changes of less than 10^{-6}in, in this application the sensitivity is reduced since the normal tolerance required is only about 2×10^{-5}in. The calibration of the apparatus is, therefore, suitable for long periods in spite of the bad operating conditions.

Particles and Accelerators

further report of B.A discussions

HIGH energy particles and machines for their acceleration were among the subjects dealt with in Section A - Mathematics and Physics - at the British Association meeting at Birmingham.

Prof.R.E.Peierls (Department of Mathematical Physics, Birmingham University) explained that the interest of fast particles to the nuclear physicist resulted from the fact that, while a good deal was known about the way in which atomic nuclei were built, little was known about the forces that held them together. More could be learnt by studying collisions of such particles at high energies, during which mesons were produced, just as at lower energies light quanta were produced by the collision of electrically charged particles.

Production of Mesons

The heavier "pi" mesons could be produced now in the laboratory by several machines which were in operation in America and would also be available in this country. The lighter "mu" mesons could not be made directly, but resulted from the breakup of "pi" mesons. There was now clear evidence of a third kind, which was still heavier. It was not yet clear precisely in what circumstances it could be produced except that it certainly needed particles of much higher energy than were now available. Faster particles would also settle whether the proton (the hydrogen nucleus) possessed, like the electron, a counterpart of opposite charge. The least energy required to produce such "negative" protons was about one thousand MeV.

Mr. D.W.Fry (Harwell) pointed out that types of accelerator included the resonant transformer, electrostatic generator, continuous-wave and frequency-modulated cyclotrons, the betatron and the synchrotron. Two of the main objects in developing the linear accelerator were to minimize radiation losses, which became large when very high energy electrons travelled round a cyclic accelerator; and to make the cost a linear function of the energy generated instead of proportional to its square or more. Joint studies of the T.R.E. (Malvern) and A.E.R.E. (Harwell) with the Medical Research Council had enabled two "sizes" of linear accelerator to be designed for use as therapeutic "tools". The 4 MeV type, which was to be installed by the Ministry of Health at several regional centres would have an accelerating tube one metre long mounted across a long gantry in such a way that the setting up of the patient would be a simple procedure. The mean beam energy would be 4 ± 0.5 MeV and the X-ray output not less than 200r/min at one metre without filtration. The 10 MeV type was to be installed at the Medical Research Council's radiotherapeutic unit under the direction of Dr. Constance Wood at Hammersmith Hospital. It was in an advanced stage of assembly at the laboratories of the Metropolitan-Vickers Electrical Co.

A linear accelerator of 1,000MeV was being actively worked upon at Stanford University, California. With corrugated metal wave guides peak power of 200 to 300 MW at a wave length of 10cm would be required, to produce which would entail a large amount of valve research and high frequency engineering effort.

Theoretical consideration of wave guide systems of appreciably higher efficiency promised to reduce the total r.f. power requirement to about 50 MW. Some experimental work on dielectric loaded guides was now being done.

Dr. L.U.Hibbard (Physics Depart-

ment, Birmingham University) gave some details of the Birmingham synchrotron, which has been under consideration for three years. It was designed to accelerate protons (hydrogen nuclei) to cover 1,000MeV in one second with applied a.c. at only 240 V. The particles were kept in a fixed circular orbit of 30 ft diameter by means of an annular magnet.

The magnet consisted of 2,400 vertical C-shaped plates packed together tightly in the form of an annulus. The C-gap in each plate was on the outside and the particles moved in the ring space so formed. The plates were flat and 0.5 in thick, inclined to each other; machined wedge plates filled the gaps between plates on the outside radius to make the structure tight. Wedge-shaped gaps left between plates on the smaller radius were used as air ducts for forced cooling of the windings by a fan in the space at the centre of the annulus. The magnet winding consisted of 24 turns of heavy stranded conductor wound in the central space of the C-ring, embracing the complete magnet.

The magnet was energized by a pair of d.c. generators in parallel that were excited to 1,100 V and the output then suddenly switched across the magnet windings. Current built up from zero to 12,000A in one second, giving a field of 15,000 gauss in the C-gap. Energy was withdrawn from the magnet by reversing the excitation of the generators, making them function as motors driven by the magnet. The generators were driven directly by a mains operated a.c. motor, but peak energy was largely supplied and absorbed by a 36 ton flywheel on the same shaft.

The protons travelled 120,000 miles round the magnet. So that they should not drift outside the allocated space, it was necessary to shape the magnetic field to cause it automatically to exert focusing forces. This was done by tapering the magnet pole faces so that the field fell off slightly with increasing radius. It was also necessary to reduce the number of collisions with gas atoms. This was done by enclosing the particle space in a porcelain vacuum chamber, pumped to 10^{-6} mm of mercury.

It was necessary to relate the frequency of the accelerating voltage very accurately to the magnetic field; at the instant when particles were injected an error of $\frac{1}{2}$ per cent could be permitted. Therefore the frequency was generated by a beat oscillator with a rotating condenser whose speed was correlated by an elaborate servo system with the voltage applied to the magnet.

Harwell Cyclotron

Dr. T.G.Pickvance (head of Cyclotron Group, Harwell) described experiments with the 110-in Harwell frequency modulated cyclotron which type could accelerate particles to much higher energies than an ordinary cyclotron.

It was first operated at the beginning of December, 1949. Designed for the acceleration of protons, its maximum energy was 175 MeV with a mean beam of about 1.5 μA.

The magnet had straight-sided poles of 110 in diameter and 12in apart. The yoke and poles were built of 670 tons of low-carbon steel in 10-ton plates and the windings contained 70 tons of copper strip. About 350 kW produced a normal centre field of 16,500 gauss; the windings were oil-cooled. A stainless steel vacuum chamber sealed to the sides of the magnet poles was evacuated to about 10^{-6} mm of mercury by three 20 in diameter oil diffusion pumps with a speed of 10,000 litres/second; the volume of the vacuum system was about 12,000 litres.

A single copper accelerating electrode, the "dee", was mounted between the magnet poles with a grounded copper sheath which concentrated the field and acted as a second "dee"; all supported by a system of resonant coaxial transmission lines, one of which was terminated by a motor driven condenser to provide frequency modulation. The condenser was placed in the region of low magnetic field to reduce losses due to eddy currents in the rotating parts. A single triode valve was coupled to the resonant lines so that the whole system operated as a grounded-grid oscillator. All parts which carried large radio-frequency currents were water-cooled. A d.c. bias voltage was supplied to the "dee" and lines to collect stray electrons which would otherwise oscillate in the radio-frequency field and would produce discharge, thus so heavily loading the oscillator

that it would not operate without the bias voltage.

The protons were produced at the centre of the machine, between the "dee" and the grounded sheath, by a low voltage discharge in an ion source containing hydrogen. An adjustable probe target could be set at any radius so that the proton beam could be intercepted at any energy level from 0 to 175 MeV. Apparatus could be inserted on the probe through an air lock without disturbing the vacuum.

They had investigated the interaction between protons and neutrons; they would next measure the angular distribution of neutrons scattered by protons; they had studied nuclear explosions which occurred when target materials were bombarded by high energy neutrons and protons; they used photographic emulsions and cloud chambers to enable individual events to be studied, since they provided permanent records of the tracks of ionising particles. In suitable cases, the identities and velocities of the particles could be established, in addition to their number and directions.

"Civil" Uses

Sir John Cockcroft (director, Harwell) made a statement on civil applications of atomic energy. The second pile ("Bepo") which was designed to develop the equivalent of 6,000 kW of heat energy had had its uranium fuel element sheathed with an impervious metal container, so that there had not been any leakage of radioactivity from the 46,000 "canned slugs" in the pile. At the same time, metallurgical development would allow the pile power to be increased soon to about 10,000kW which would probably make it worth while to insert heat exchangers in the outflowing cooling air and so use the heat.

A sheathing metal which would withstand higher temperatures than aluminium might enable nuclear furnaces of this kind to operate for 10 to 30 years without refuelling. To determine whether the cost of extracting uranium from ores could be made reasonable, a mineral dressing and chemical engineering laboratory had been equipped at Harwell.

If design studies now proceeding at Harwell in collaboration with an industrial organisation established the feasibility of a power unit, authority would be sought for the construction of an experimental plant. It seemed likely that the first experimental pilot power producer would be operating within five years.

Dr. H.Seligman (Harwell) then spoke of the industrial uses of radioactive isotopes. Since March, 1949, more than 6,000 shipments of radioactive isotopes had been made to 24 countries. As practically all the available neutron flux in "Bepo" was now being used for this purpose, a limit to the supply of such sources might very soon be reached. These isotopes had been used to measure the rate at which the bearings of pumps would wear; the bearing was irradiated and the activity measured by immersing an X-ray film in the lubricating oil.

When cleaning long pipe lines with a metal scrubber the latter was liable to stick; the stoppage could be located by making the scrubber radioactive.

The exchange of air in a room could be checked by following the removal of radioactive gas released in the room. Thickness (or weight per unit area) measurers using radioactive beta emitters, to control the thickness of material being rolled in the production process, had been developed by different firms in this country

For dissipating electrostatic charges at the same rate as they built up, by ionising the surrounding air, strips containing radio thallium (a long-lived beta emitter) were being made experimentally at Harwell and given out on loan to firms. Trained staff was available at Harwell, as well as in some private firms, to give the necessary advice.

Mr. W.S.Eastwood (Harwell) described a range of gamma-active sources for industrial radiography. The natural emitters were "hard" and very penetrating. It was the aim at Harwell to produce inexpensive artificial sources in a range of energies from 100 kV to over 1 MeV which would be complementary to X-ray tubes and have the advantage of portability without inferior performance to that of a tube.

The activity of all these emitters decayed exponentially at a rate characteristic of the element. Their half lives varied from seconds to many years.

NEW BOOKS

Data and Cirguits of Modern Receiver and Amplifier Valves. Book III. Philips Technical Library. Pp.213; figs. Cleaver-Hume Press, Ltd., 42a, South Audley Street, London, W.1. Price 12s.6d.

In Book II of this series, valves produced up to 1939 were included. This volume carries the story up to the end of 1941. It was first published in Holland in 1943, and the preface states that it is now published in English because the complete series is intended to give an historical review of the development of European radio valves.

The major part of the book describes the "E" and "U" series of valves on the eight-pin pressed-glass base, the "Loktal" or, as the book calls it, the key base. The 1.4 V series for battery operation and the 0.1 A heater a.c./d.c. series are also described, and there are sections dealing with circuits for all three series of valves. A dozen pages on various items of Philips measuring equipment completes the book.

The data and characteristics given for each valve are very complete, but the graphs are much smaller in scale than those included in the standard catalogues and correspondingly less useful. A rather large number of the valves are obsolete. The circuits given for the "Loktal" valves suffer from the fact that at the time the book was prepared there were only a few types available. The material on test apparatus is merely a repetition of catalogue entries, no circuit details or discussion being given. It is hard to believe that the purpose for which this book was intended is not better fulfilled by the normal valve catalogues with their full details of current types.-A.H.B.

Basic Electronics, by R.G.Kloeffler and M.W.Horrell. Pp.435, figs. and index. Chapman & Hall, Ltd., 37, Essex Street, W.C.2. Price 40s.

This book is suitable for students taking a course in electronics, or perhaps for graduate physicists or engineers who have not previously studied the subject. Only elementary mathematics is used and the theoretical equipment of the reader need not be comprehensive. Both authors are Americans and practically all the commercial devices described are of American manufacture.

There is a short chapter on fundamental concepts, a chapter on electron emission and one on conduction of electricity in gases. There is nothing novel in the descriptions in four chapters of diodes, tetrodes, pentodes and their uses in rectification, high and low frequency and power amplification; there are the usual discussions of audio, video and radio frequency amplification. Most of the important oscillator circuits are briefly discussed and there is a chapter on modulation and detection.

Gas-filled rectifiers, relays and ignitrons; photocells and multipliers; and cathode-ray tubes and their circuits are treated more briefly. The information given here is perhaps enough to provide a basic understanding of the way these devices work, but it is by no means complete. There is still briefer mention of a number of other subjects such as silicon and germanium crystals, including a mention of the transistor, barrier layer cells, electron microscopes, iconoscopes, X-ray tubes, some of the modern high-frequency valves including velocity modulator valves and magnetrons, and high-intensity flash discharge lamps.

Useful questions and examples are given at the end of most of the chapters.

A few references are quoted and more would be better. The writing is clear, the printing and diagrams are excellent, but the price is high.- V.J.F.

BOOKS RECEIVED

Electrical Installation Work. By T.G.Francis. Pp.232; figs. 137; index. Longmans, Green & Co., Ltd., 6 & 7, Clifford Street, London, W.1. Price 12s.6d.

Applied Electricity. By Edward Hughes. Pp. 412; figs.269; index. Longmans, Green & Co., Ltd., 6 & 7, Clifford Street, London, W.1. Price 10s.6d.

Resistance Welding in Mass Production. By J.Hipperson and T.Watson. Pp.278; figs.228; index. Published for "Welding" by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 21s.

Commerce and Industry

New English Electric Factory

Support for Trolleybuses

THE Board of Trade announces that it has allocated the surplus Government factory at Clayton-le-Moors, Accrington, to the English Electric Co., Ltd., for light engineering and the manufacture of electrical equipment. The factory is at present occupied by Courtaulds, Ltd., who, owing to re-organisation, are giving it up. It is the intention of the English Electric Co., to absorb the existing labour force.

G.E.C. at Singapore

At the recent Singapore Post-War Exhibition, held at the Happy World Park, Singapore, and supported by all the main importers in that city, the Singapore Branch of the General Electric Co., succeeded in gaining second prize in a competition for the best dressed stand. The equipment shown on the G.E.C. stand was representative of a wide range of the company's products, including a display board of "Osram" fluorescent lamps, an illuminated display of G.E.C. airport lighting, together with samples of the fittings used, G.E.C. radio sets, cookers, household appliances, refrigerators, etc. Also on show was the twin broadcast programme hospital amplifying equipment produced for the Taiping Military Hospital. A working display of intercommunication telephones proved a popular attraction.

Dollar Trade Promotion

On 7th September the British Trade Promotion Centre was opened on Fifth Avenue at 53rd Street, New York. It is being organized and managed by the British Commonwealth Chamber of Commerce in the United States. Organizations in the United Kingdom which have already decided to participate in the Centre are the Dollar Exports Board, the Federation of British Industries, the National Union of Manufacturers, the Scottish Council (Development and Industry) and the B.E.T.R.O. The Centre's main functions will be to provide information, advice and aid to British industrial organizations and also individual firms on every aspect of exporting British goods to the United States, and to repre-

The G.E.C. Stand at the recent Post-War Exhibition held in Singapore

sent the views of British industry, as occasion requires, to American authorities and American business men.

Morecambe Illuminations

Ekco-Ensign, Ltd., informs us that of the half-a-million lamps which are being used for the Morecambe illuminations, 60,000 were supplied from the company's Preston works. The company was also responsible for spraying all the old lamps used in the display.

Fluorescent Fittings Display

A display of the newest types of "Sieray" fluorescent fittings is to be held at the head office and the various branch showrooms of Siemens Electric Lamps & Supplies, Ltd., during the week 18th to 22nd September. In Bristol the display will be at Frankfort House, 17, Whiteladies Road (the branch premises in that town having been demolished by enemy action), and at Birmingham the fittings will be shown at the Cobden Hotel, Corporation Street, as the branch showroom there has not the necessary accommodation.

Berry's in Chicago

The accompanying picture shows the stand of Berry's Electric,Ltd., at the First International Chicago Trade Fair. The fires shown are from the range made exclusively for the United States market.The background and display material was fabricated in England and stripped ready for assembly.

Electric Motors for Uruguay

Tilling-Stevens, Ltd., recently received an order from Montevideo for 1,000 electric motors ranging from ½ to 2 h.p. Speedy delivery was the essence of the contract and the packing and dispatch to docks was completed in sixteen working days. At the same time another 100 ½ h.p. machines were also packed and dispatched to New Zealand.

Plant for South Africa

An order has been received by the Metropolitan-Vickers Electrical Co., Ltd., for two 15,000kW, 3,000 r.p.m. turbo-generators, complete with condensers, feed heaters, and evaporators. The plant will be installed in the West Bank No. 2 power station of the Electricity Supply Commission of South Africa. Situated on the Buffalo River at East London, the station will be adjacent to the existing No. 1 station for which the company has already on order a triple-effect central evaporating plant which will produce 15,000 lb of distilled water per hour. Merz and McClellan are the consultants for both contracts. Designed for initial steam conditions of 400 p.s.i.g., 800 deg F, the turbines are of single cylinder construction; each contains a two row velocity-compounded stage followed by seventeen single impulse stages and a duplex multi-exhaust stage. Central-flow condensers, each of 17,500 sq ft sur-

Display of Berry fires at the Chicago Trade Fair

face, provide a vacuum of 28.7in Hg at the economic rating of 12,000kW. The bled steam feed heating system for each machine comprises ejector heaters, a drain cooler, one low-pressure and two high-pressure feed heaters. Final feed temperatures will be 280 deg F and 293 deg F at the economic and maximum continuous ratings respectively. The three-phase machines will generate at 11 kV and are air-cooled with closed-circuit ventilation systems.

Leeds Building Week

On Monday last a Building Week was opened at Hunslet Moor, Leeds. The display has been organized by the Ministry of Works in association with other Government Departments, professional and industrial organizations, and technical colleges, and is intended to give the public the opportunity to learn more about this industry, its efforts and achievements. Included among the exhibitors is the Yorkshire Electricity Board on whose stand is shown electrical equipment illustrating the comprehensive electrical service available to the public. The exhibits include installation materials, water heating apparatus, an all-electric kitchen, large-scale cooking apparatus, and a display showing how the supply of electricity is brought from the power station to the consumer.

The Case for Trolley-buses

An interesting leaflet has been produced by the British Electrical & Allied Manufacturers' Association entitled "Why Trolley-buses ?" in which the case for this type of public passenger transportation is attractively set out in popular style. It consists of a series of questions by people directly concerned, including a regular passenger, an M.P., a Council member, a transport manager, a ratepayer and a driver. In answering these questions it is shown that the advantages of the trolley-bus include, among other things, its greater carrying capacity and comfort, its contribution to the economic use of the nation's resources in men and materials, its cheapness in running and silent service, small maintenance as compared with motor buses, and ease in handling from the driver's point of view. Graphs show the growth in the number of trolley-buses in Great Britain and the imported fuel saved in the years 1930 to 1949, and also the increase in the number of trolley-buses in the United States. The leaflet can be obtained free from the Association, 36, Kingsway, London, W.C.2.

Lead Price Increase

The Ministry of Supply has announced a further increase of £8 per ton in the price of good soft pig lead, as from 9th September, raising the price to £128 per ton.

Dearer Zinc

As from 8th September the price of good ordinary brand zinc was increased by £20 to £147.10s. per ton, delivered. Prices of other grades were varied accordingly. The prices of zinc oxide were raised by £17 10s. at the same time

American Hire-Purchase Restrictions

Under powers bestowed upon it by the Controls Bill the United States Federal Reserve Board last week issued new rules governing hire-purchase agreements. It is ordered that at least 15 per cent of the purchase price of radio and television receivers, refrigerators, and a number of other domestic electrical appliances must be paid initially and the period for payment must not exceed 18 months.

Cables for Egypt

Delivery within four weeks of receipt was a condition of an order recently received by Aberdare Cables, Ltd., of South Wales, from the Egyptian Government. It was for 25,000 yd of underground cables, and within the prescribed time the whole order, contained on sixty drums, was on its way.

Co-ordinating Resistor Production

Representatives of licensees of the International Resistor Co. recently attended a week's session at the company's Philadelphia office. They inspected the company's much expanded production facilities and joined in planning a stepped-up production programme. The representatives were from I.R.C.-licensed

plants in Canada, Denmark, England (Dubilier Condenser Co.(1925)Ltd.), Australia and Italy. To meet the resistor requirements of electronic equipment producers, I.R.C. capacity already is being supplemented by licensees in Canada and Denmark, and English, Australian and Italian licensees are shipping resistors to other world markets formerly served from the United States. The new integrated production programme will permit the company to devote more of its resources to the satisfaction of American resistor requirements.

Trade Announcements

J.G.Coates, Ltd., Thornybank Mill, Trafalgar Street, Burnley, Lancs., have been appointed distributors for Tilling-Stevens electric motors.

Elexcel, Ltd., has opened a new office at Strowger House, 14 Hanover Square, Leeds, 3, (telephone: Leeds 30174). Mr.A.H.Armitage, the company's representative in the East and West Riding territory, will work from this address. The company has appointed Mr.J.L.Lovell, 3, Hazelton Road, Bristol,7, (telephone: 46948) as representative in the South Western Electricity Area.

The British Vacuum Cleaner & Engineering Co., Ltd., says that its subsidiary,B.V.C.Industrial Constructions, Ltd., has removed to Terminal House, 52, Grosvenor Gardens, London,S.W.1.Also opened at these premises are the new export showrooms of the British Vacuum Cleaner & Engineering Co., Ltd.

Two branch offices and depots have recently been opened by Standard Telephones & Cables, Ltd.,(Newport Cables Division). Under the management of Mr.D.J.Cater, one of the new branches is at 167,Hockley Street, Birmingham, 19, (telephone: Northern 2788); the other branch, at 59a, Bath Street, Glasgow, C.2., (telephone: Douglas 0519), is managed by Mr.W.Steven.

Easco Electrical, Ltd., 6-8 Brighton Terrace, London, S.W.9., has appointed Land Speight & Co., Ltd., 73,Robertson Street, Glasgow, C.". as its distributors in Scotland.

Aircraft Power Equipment

Two recently published standard specifications deal with transformers rated at from 500VA upward as well as auto-transformers; also metal rectifiers, stacks and stack assemblies, all for power circuits in aircraft. They are respectively designated B.S.G. 127 (price 2s) and B.S.G. 126 (price 1s) and are available from the British Standards Institution, 24, Victoria Street, London, S.W.1.

Change of Name

Edlin Coils have changed their name to Edlin Electrical Equipment Co., and have taken over new office and works premises at 5, Edwin Road, Twickenham, Middx (telephone: Poyesgrove 1450). The constitution of the company remains unchanged.

Catalogues and Lists

Higgs Motors, Ltd., Witton, Birmingham, 6.- Abridged price list of a.c. and d.c.motors and generators.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 30th August:-

Hoover. No.B 680,777. Class 9. Cooking utensils included in Class 9, flat-irons, percolators, door bells and chimes, burglar alarms, vacuum chimney-sweeping apparatus, door and window opening apparatus; and carpet shampooing machines, floor polishing machines and floor waxing machines (all for domestic use).- Hoover, Ltd., Perivale, Greenford, Middlesex.

Signal-Stat. No.B 689,201.Class 9. Switches for use in connection with directional signal indicating lamps for vehicles. Signal-Stat Corporation, New York, U.S.A. Address for service, c/o C.Lockett Hughes, 46 Bedford Row, London, W.C.1.

Stronivision. No.689,364.Class 9. Television apparatus and parts thereof included in Class 9.

Telstronic. No.689,365. Class 9. Wireless, television and telegraphic instruments and apparatus, and parts included in Class 9.- Hale Electric Co., Ltd., Radio Works, Talbot Road, West Ealing, W.13.

Bell (design). No. 686,238.Class 11. Electric lighting fittings and parts thereof included in Class 11, and electric lamps, all made wholly or principally of plastics.-British Electric Lamps, Ltd., Spencer Hill Road, Wimbledon, London, S.W.19.

Crawley New Town sub-station, showing screen walls and unobtrusive siting

Crawley New Town

first substation goes into service

THE first electricity sub-station to be completed for the first of the "new towns" being built in this country has now been commissioned by the South Eastern Electricity Board to serve residential properties forming part of Crawley New Town, in Sussex, which is being laid out for a self-contained community of 60,000. The distribution system has been designed to deal with the electrical development in three stages of approximately 20 MVA each, related to the anticipated maximum demand of all domestic, commercial and industrial consumers. The system is based on the principle of a uniform low-voltage network supplied by 500 kVA sub-stations, which will be provided as needs demand; approximately 40 for each stage will be commissioned.

Major reinforcement of the grid point at Three Bridges will be necessary in order to serve the Board's bulk supply sub-station, which will be established at Three Bridges, for supplying the New Town network at 11 kV.

Close collaboration between officers of the Board and the Development Corporation has resulted in the adoption of a type of outdoor sub-station, economising in space and capital cost and lending itself to wooded environment or embodiment in screen walls, occupying approximately 144 sq ft. Within the enclosure are the high-voltage controlling equipment and transformer, and mounted flush with the front portion of the fence are a 5-way distribution pillar and fifth-core street lighting control pillar, access to which is obtained from the footpath, thereby making entry to the enclosure unnecessary.

The design and construction of the Crawley distribution system is being carried out by the staff of the Mid-Sussex Sub-Area of the Board.

DUAL SERVICES AT SWINDON

Swindon Corporation has approved the provision of both gas and electricity services in all houses to be erected on the Penhill Estate.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

Ruston & Hornsby, Ltd., held their annual meeting on 7th September. In his circulated statement, Mr.J.H.W. Pawlyn (chairman) said that the falling off in the net profit was nominally due to the increased charge for taxation, but it also reflected the narrowing gap between costs and selling prices. Actually, dispatches for the year showed a further increase over the previous year. The tapering off in the large programme for meeting the demand for stand-by electrical generating sets referred to last year had affected the profit of Davey, Paxman & Co., Ltd. The falling off in profits during the year had been a gradual process and they must anticipate some further deterioration in the current year. Their Australian and Indian subsidiaries had another successful year and their investments in Ransomes, Sims & Jefferies and Aveling-Barford had earned dividends at the same rate as last year. Their technicians had been engaged on the design of new ranges of oil engines and prototypes were in course of production. Their boiler and general engineering works was working to capacity and production of diesel locomotives was maintained, though there was a swing-over in demand from the smaller to the larger sizes. In co-operation with the British Thomson-Houston Co., Ltd., they had produced their first diesel-electric locomotive. The world demand for all types of oil engines was well maintained, and though the size of the order book was somewhat smaller than a year ago, this was due more to increased productivity than to a serious falling off in world demand.

Parmiter, Hope & Sugden Ltd., held their annual meeting on 7th September, Mr.E.W.Sugden (chairman) presiding. In the course of his speech the chairman said that the year's trading was satisfactory. Although costs had generally risen, partly as a result of the engineering wages advance made during the later part of the previous year, the prices of their products were not increased. The profit, which was very little changed from that of the previous year, had been earned on a very similar turnover. The difference between the two years was a very slight reduction during the year under review represented by a smaller value of work in progress at the end of the year, as actual sales had increased slightly. During the current year the general level had been well maintained. The output compared satisfactorily with that of the corresponding period in two preceding years, and the order level, although not so high as in previous recent years owing to the necessity of their being able to quote shorter delivery periods, was satisfactory. New lines which had been launched had met with an encouraging reception.

James Howden & Co., Ltd. The annual meeting was held on 6th September, Mr. C.W.Hume (chairman) presiding. In his statement issued with the report and accounts the chairman said that the orders on hand constituted a record and the demand both home and overseas for their special equipment for power plants, land and sea, continued to increase.

Britannia Electric Lamp Works, Ltd., reports a group profit for the year to 31st March last, after meeting charges and providing £33,640 for taxation, of £29,165, compared with £22,624 for the preceding year. Group profit attributable to members of the holding company, after deduction of outside interests, is £28,096 (against £21,339). The dividend for the year is unchanged at 12½ per cent.

Lancashire Dynamo & Crypto, Ltd., has declared an interim dividend of 5 per cent on £498,707 capital. Last year the interim was 5 per cent on

£480,000. New capital issued last month does not rank for current payment.

Eveready South Africa, Ltd., reports a net profit for the year to 30th June last of £90,851, as compared with £118,770 for 1948-49. After providing £11,200 for taxation, it is again proposed to pay a dividend for the year of 30 per cent. Reserves and carry-forward are £220,936 (against £214,597).

Christy Bros. (Chelmsford), Ltd., propose to create an additional 50,000 £1 ordinary shares to meet current capital expenditure and provide for future developments. A meeting of shareholders is to be held on 29th September at which the board's proposal will be submitted for approval.

The Brush Electrical Engineering Co. is paying an interim ordinary dividend of 4 per cent on £2,400,000 capital as increased last July. For 1949 the interim was 4 per cent, followed by a final of 6 per cent on £1,600,000 capital.

Walsall Conduits, Ltd., has declared an interim dividend of 20 per cent actual, less tax.

The Watford Electric & Manufacturing Co. Ltd., is again paying an interim dividend of 5 per cent.

The British Oxygen Co., Ltd., has declared an interim dividend of 8 per cent (unchanged).

NEW COMPANIES

Liver Electric Cables, Ltd.- Registered 1st September. Capital £100. Directors: W.J.Terry, 24, Queen Anne's Gate, Westminster, S.W.1 (director of London Electric Wire Co. and Smiths, Ltd., etc.) and G.E.Jewell. Registered office: 24, Queen Anne's Gate, Westminster, S.W.1.

Hartog Electric Lighters, Ltd.- Registered 1st September. Capital £5,000. To acquire letters patent, brevets de invention, etc. Subscribers: R.T.Stoneham and G.W. Russell. Solicitors: Stoneham & Sons, 108a, Cannon Street, E.C.4.

Acme Electrical Manufacturing Co. (Tottenham), Ltd.- Registered 4th September. Capital £18,000. To acquire business of electrical engineers carried on by A.E. and A.C.Wheeler at Tottenham, N.17, as the Acme Electrical Manufacturing Co. Subscribers: A.E.Wheeler and A.C.Wheeler. Registered office: Tariff Road, Northumberland Park, N.17.

Radio Guarantee Co. (Oxford), Ltd. Registered 4th September. Capital £1,000. To carry on the business of electricians, radio and television engineers and repairers, electrical engineers and contractors, etc. Directors: W.G.Joyce, G.Baker and J.Bindley. Registered office: East Street, Fritwell, Oxon.

Alpho Electric Co., Ltd.- Registered 2nd September. Capital £500. Electrical engineers and contractors and manufacturers of and dealers in electrical apparatus and supplies, etc. Directors: W.Chandler and P.Shannon. Registered office: 53c, Fulham High Street, London, S.W.6.

Raylecto (Penge), Ltd.- Registered 1st September. Capital £500. Electrical and radio engineers, etc. Directors: W.G.Smith and W.A.Ward. Registered office: 65, Haling Park Road, South Croydon.

Ferguson Electro Mechanical Developments, Ltd.- Registered 23rd August. Capital £4,000. Electrical and mechanical engineers, manufacturers of and dealers in electrical plant, machinery and appliances, etc. Directors: B.Ozias, J.H.Campion, J.Mooney and E.S.Bailey. Regd. office: 115 Chancery Lane, W.C.2.

A.E.Sommers & Co., Ltd.- Registered 18th August. Capital £500. Electrical equipment specialists; manufacturers of and wholesale and retail dealers in resistances, chokes, batteries, accumulators, etc. Directors: A.E.Sommers and A.P.Sommers. Regd.office: 96a, Sydenham Road, S.E.26.

BANKRUPTCIES

R. D. Nichols, carrying on business at 9, Friary Street, Plymouth, as electrical engineer, under the name of the Eagle Electrical Engineering Co. First meeting 12th September at the Official Receiver's office, 24, Lockyer Street, Plymouth. Public examination 6th October at 4, Elliott Street, The Hoe, Plymouth.

STOCKS and SHARES

STOCK Exchange markets are accepting the present position with equanimity. As mentioned here three weeks ago, the Stock Exchange slogan for the time being is - "the worse the news, the better the markets." Prices present a robust resistance to any depressing influences in the news, whether it comes from Korea or Whitehall. Reports and dividends continue to be generally satisfactory, and investment money flows in a steady stream into the House. British Government and other gilt-edged stocks advance consistently. The prices of the leading industrials more than hold their ground.

Company News

Christy Brothers (Chelmsford) present good figures in the second annual report to be issued since the firm came into being through the dissolution of the original company under the 1947 Electricity Act. Trading profits expanded by about 70 per cent, and the net result covers very comfortably the 6 per cent dividend. At 23s, the £1 shares pay nearly 5¼ per cent on the money. An increase in capital is proposed. Eveready (South Africa) 5s shares were introduced to the market last November, with a warning that the continuation of the Union's import restrictions would affect profits. That they have, in fact, done so is shown in the preliminary statement of profits, which just provide for the maintenance of the dividend at 30 per cent. The shares stand at 18s 3d.

Dividends to Come

Crompton Parkinson's financial year ended in June and the final dividend is expected well before the end of the year. Following last year's 100 per cent capital bonus, the interim dividend in May was correspondingly halved. On the same basis, the year's total would be 11¼ per cent, and the yield on the 5s shares, at 12s 3d, nearly £4 12s per cent. A final dividend will be due in a few weeks' time from Tube Investments, for the year ended last July. Last year's total of 25 per cent came from earnings of close on 100 per cent and, if repeated, would provide about £4 1s per cent yield on the £1 shares at 6 3/16. Other final dividends due shortly are those of Crabtree Electrical, Peto Scott and Morphy-Richards.

Brush Electric Interim

The 4 per cent interim now declared by Brush Electrical Engineering is at the same rate as before, but applies this time to capital increased by 50 per cent as a result of the one-for-two issue of shares to stockholders last July. Maintenance of this dividend agrees with the directors' forecast at the time of the issue. At about 6s 3d the 5s ordinary shares yield 8 per cent, a return which is perhaps influenced by the consideration that the funds raised by the last issue, while covering immediate requirements, were short of the total permanent capital likely to be ultimately called for.

Price Changes

Falk, Stadelmann, 35s., Mather & Platt, 36s 3d, are both 1/16 harder on the week. Vactrics have been active at the advanced price of 8s 9d. Ericssons at 47s 6d and C.A.Parsons, 68s 9d, are harder. General Electrics, now quoted ex dividend, stand at 82s 6d. Aberdare Cables eased off to 14s and Cape Electric to 27s 6d.

Radio Shares

Opening of the annual radio show generally stimulates interest in the shares concerned. On this occasion, the effect of the Birmingham Exhibition has largely failed to make the radio market an exception to the unenterprising state of affairs prevailing elsewhere. The strength of A.C.Cossor shares is the feature: now at 10s they have risen about 1s during the past week. Although coinciding with the Exhibition, the rise in Cossors is generally credited to the transformation from loss to profit disclosed in the recent annual profits statement. E.K.Cole 5s shares are firm at 16s, as are the newcomers, Murphy Radio, at 7s 6d and E.M.I. at 22s 9d.

ELECTRICITY SUPPLY

Chadderton Extension Approved : Australian Power Programme

THE British Electricity Authority has received the consent of the Minister of Fuel and Power to the development of the new Chadderton power station, Oldham, Lancashire, to its full capacity. Authorisation was given last January to the establishment of this station and the installation of a 60,000 kW turbo-alternator, two boilers each of an evaporative capacity of 360,000 lb/hr, and a cooling tower. The new consent covers the installation of three further 60,000 kW sets, six 360,000 lb/hr boilers and three cooling towers. The total installed capacity of the station, upon which construction work has already begun, will thus be 240,000 kW.

The British Electricity Authority has applied to the Minister of Fuel and Power for consent to extend the Runcorn power station, Accrington.

It is expected that the first of the five 50,000 kW sets at the Agecroft (Salford) power station will have its test run in a few weeks' time and will be put into service before the end of the year.

Loch Sloy Inauguration

Her Majesty the Queen will inaugurate the North of Scotland Hydro-Electric Board's Loch Sloy scheme on 18th October.

South Western Board's Finances

At a special meeting of the South Western Electricity Consultative Council on 8th September the South Western Electricity Board's financial position was reviewed by its chairman, Mr.S.P.Steward, C.B.E. Mr.Steward said large scale expenditure was unavoidable if the Board were to make good the effects of insufficient maintenance during the war years and provide for extending and strengthening rural networks to meet the load which was increasing by about 10 per cent each year.

Although the Board's programme was being cut down by the Government's policy of restricting capital expenditure, it was expected that by 1953 a sum approaching £15 million would have been spent on engineering works, and already some £4 million had been spent on developing and strengthening rural networks.

The Board's charges for interest and depreciation would accordingly increase substantially year by year. The Board was also having to pay an increased price for electricity to the B.E.A. and furthermore increases in salaries and wages, arising from national agreements, were adding almost £100,000 to the annual bill.

New Belfast Station Proposal

The Northern Ireland Ministry of Commerce has informed the Belfast Corporation that it intends to issue in the near future a scheme for a new generating station at the Harbour with an initial capacity of 60 MW. The "Northern Whig" states that negotiations are in progress with plant manufacturers regarding prices and the availability of plant and with the Harbour Commissioners with regard to the station site.

Cork Water Power Scheme

The Irish Minister for Industry & Commerce has approved the River Lee (Cork) hydro-electric scheme which is estimated to cost £265,000.

Edinburgh Reserve Fund

The South East Scotland Electricity Consultative Council is to support the request of the Electricity Board that the £1,000,000 reserve funds of undertakings in the area shall be returned to the Board. The Ministry of Fuel and Power has said that the 1947 Electricity Act provided only for the taking over by the Electricity Boards of property rights, liabilities and obligations. There was no specific reference to reserve funds which, in so far as they were represented

by cash or investments, vested in the Central Authority. The Minister had decided that there was no ground for action by him. The Electricity Board contends that it was not the intention of the Act to take the reserves of any Area for the benefit of other Areas; this would be unjust to the consumers in that Area. It has asked the Minister to deal with the matter again and the Consultative Council is also to make representations to him.

Objection to Overhead Line

The Ilkley Council has objected to a proposal of the Yorkshire Electricity Board to erect an overhead line across Ilkley Moor to the West Riding County Policy radio station at Whetstone (or Keighley) Gate. The Council has approved the recommendation of the General Purposes Committee that the County Area Planning Officer shall be asked to consider this matter with a view to suggesting to the police authority and the Board the use of generators or other alternative methods of obtaining a supply of electricity at the police post without any injury to the amenities of the area.

Preservation of Wales

Responding to a request from the Birmingham & District Welsh Central Committee that it should oppose the B.E.A.'s North Wales water-power schemes the Rhayader Rural Council has expressed the view that if Wales was to progress it had to accept those things which accompanied progress. It says that it had frequently pressed for the electrification of its own area and therefore could not "blow hot and cold". The Council further says that when the Elan Valley dams were constructed there was much protest, but now the lakes which were thus formed attract large numbers of visitors.

Bristol Housing Agreement

A long controversy between the Bristol Housing Committee and the South Western Electricity Board has been ended by the Committee's agreement to install additional electricity points for cookers and water heaters in houses on Corporation estates. The Board had refused to supply electricity until the points were installed, or the Committee agreed to pay part of the capital cost of the electrical work. The deadlock has continued for some weeks and completed houses on one estate have remained empty as a result. The cost will be between £5 and £10 per house.

Immersion Heater Hire

It was recently pointed out by the Scunthorpe (Lincs.) Trades and Labour Council that while consumers in the neighbouring town of Grimsby could hire immersion heaters those in Scunthorpe could not. The Yorkshire Electricity Board has replied that the Grimsby hire scheme was introduced before the nationalization of the industry and was being continued pending the formulation of a general policy by the Board. Scunthorpe consumers could secure immersion heaters on hire-purchase terms.

Refrigerators for Northampton Houses

The Northampton R.D.C. is seeking permission to borrow £6,230 for installing 200 refrigerators in Council houses. Each tenant having a refrigerator will have to pay an additional 1s.9d. per week.

Power Plant in Australia

A survey of existing power plant in Australia and of projects for future development conducted by the Ministry of National Development indicates that Australia's generating capacity will double by 1958. At 1st March last the installed capacity was 2,123.3 MW and a further 1,577 MW was under construction; the estimated capacity in 1958 is 5,574.5 MW. Looking further ahead, it is stated that by 1975, when 2,800 MW is expected from the Snowy Mountains hydro-electric scheme, the total will probably have risen to 8,800 MW. The expenditure of £276 million is anticipated during the period ending in 1958 and, apart from this, the Snowy Mountain plan is expected to cost about £200 million in the next 25 years.

Uruguayan Development Loan

A 24-year 3¼ per cent loan of $ 33 million has been made by the World Bank to the Uruguayan General Administration of Electrical Power and Telephones. The loan will be employed in the further expansion of electrical services and telephones.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

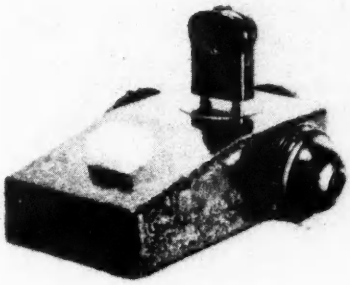
Desk and Ceiling Fans

Two new fans have just been placed on the market by the Carter Electrical Co., Eastern Works, Eastern Avenue, Romford, Essex. The "Aerosorew" for domestic use gives an air delivery from its 12in diameter blades of 400-500 cu ft/min at a velocity of 600-700 ft/min. It is rated at 28 W and is suitable for working from 200-240 a.c. mains. It is supplied in cream and green, light brown and buff or olive green, although other colours are available.

The "Coolbreeze" fan is a 24in a.c. single-phase ceiling fan rated at 70 W and its displacement is about 4,000 cu ft/min. Available for voltages from 100-250 V a.c., it is driven by a squirrel-cage motor with ball type bearings. This appliance is available either as a squat ceiling type or in a down-rod style variable to specific requirements. It is finished in cream or black crackle enamel.

Carter "Coolbreeze" ceiling fan

Casteloo foot-operated switch



Rubber Plugs and Sockets

It is announced that apart from 3-pin 5 A and 3-pin 15 A rubber plugs, W. W. Haffenden, Ltd., Richborough Rubber Works, Sandwich, Kent, are now making corresponding socket outlets with rubber mouldings. Furthermore, the plugs have been modified to incorporate a cord grip and, if so desired, the earth pin may be removed; the flexibility of the pin mounting enables the plug to be used in any standard 2-pin socket. Apart from the feature that they are unbreakable the socket outlets have the advantage that no metal parts are exposed so that they may be used as floating connectors.

Foot-operated Switch

A 6 A foot-operated multi-purpose combined series-parallel, on-off switch which has been designed by Casteloo (Great Britain), Ltd., Castle Works, High Street, Old Woking, primarily for photographers is equally suitable for operating a single-phase motor up to ¼ h.p., for use in workshops, laboratories, for surgical equipment, for stage-lighting effects, etc. It is supplied in three alternative colours for 28s.

Germanium Rectifiers

The range of germanium crystal rectifiers made by the General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2, has been supplemented by the addition of the GEX.45 which has been introduced to meet the needs of designers who wish for a low reverse current but do not require the exceptionally low figure given by type GEX.55. The latter has a reverse current of less than 10μA at 10 V and costs 30s, whereas the new type, which has a reverse current of 10μA to 30μA is 16s, and special net prices are quoted for quantities. Electrical character-

istics of the GEX.45, apart from the reverse current mentioned above, are: forward current, about 8 mA at +1 V, turnover voltage, greater than 60 V, shunt capacitance, about 1 $\mu\mu$F.

Hearing Aid

A hearing aid for persons able to tolerate only a lower maximum sound intensity than a person with normal hearing has been placed on the market by Amplivox, Ltd., 2 Bentinck Street, London, W.1. In this "Model KA" unit a flat response microphone and earphone are used with automatic volume compression (A.V.C.) applied at two alternative levels selected by a switch. In the minimum A.V.C. position the output is limited to about 5 db below the maximum possible and in the minimum position to about 10 db lower still. This provides a level which has been found acceptable to persons having only a low tolerance for sound.

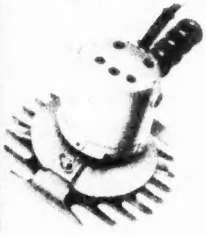
The aid is housed in a smooth die cast aluminium lacquered case measuring 5 in by 2⅝in by ¾ in, and complete with batteries it weighs 6½ oz.

Grass Trimmers

A new model of the "Grassmaster", a rotary trimmer brought out by Tarpen Engineering Co., Ltd., Ixworth House, Ixworth Place, London, S.W.3, is more powerful and has improved guarding. The machine can cut grass almost as short as a lawn mower and while suitable for use anywhere where it is difficult to work a scythe, the machine is especially suitable for cemeteries. It can also be employed as a hedge trimmer, though the manufacturers consider that a reciprocating type trimmer is preferable for this purpose.

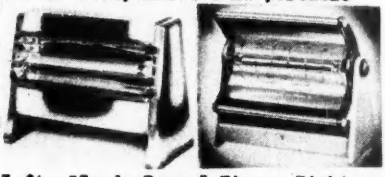
Three models are available - a 7 in short-handled machine, a similar unit with a long handle, and a special 4 in long-handled machine for use in between grave kerb-stones. For 110 V and 230 V models the price is £10 for the short-handled machine and £11 for the others. An extra charge of £1 is made for other voltages.

Left: Amplivox "Model KA" hearing aid with automatic volume compression. Right: Tarpen "Grassmaster"



Two New Fires

The "Creda Raven" fire has been specially produced by the Simplex Electric Co., Ltd., Oldbury, Birmingham, to meet the wide demand for an inexpensive 1 kW portable unit. It is of attractive design and finish and sturdily constructed, and is priced at 45s (plus 33s.1d P.T. in this country).



Left: "Creda Raven" Fire. Right: B.N.E. "F103" reflector fire.

An extra-wide adjustable reflector of exceptionally high reflectivity ensures a broad, even spread of heat from the "F103" fire made by British National Electrics, Ltd., Newarthill, Motherwell. The fire conforms to the latest practice with regard to interchangeable type of element and protection against fire and accident risk and is soundly constructed. One of the two 1 kW elements is controlled by a switch. A black and ivory colour scheme and simple lines present an attractive appearance. The fire costs £5.10s (plus purchase tax in this country).

Switched Socket Outlet

T.M.C.-Harwell Sales, Ltd., 37 Upper Berkley Street, W.1, are producing two 3-pin 15A shuttered and switched socket outlets (Nos. 7031 and 7033) of a smaller size than their existing Nos. 7011 and 7012. These accessories are about 4½ in long by 2⅝ in wide and incorporate a "Temco" quick make and break switch action suitable for a.c. or d.c. and a shutter which will operate only when the plug is properly inserted.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

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Australia.- Brisbane.- 21st December. City Electric Light Co. One 30,000 kW turbo-alternator and accessories for Bulimba "B" power station. (C.R.E.(IB)63728/50.Ten/1604).*

4th October. Queensland State Electricity Commission. Radio communication system for the Wide Bay Regional Electricity Board. (C.R.E.(IB)63727/50. Ten/1603).*

Blackburn.- 21st September. Corporation. Electric street lighting installation. (See this issue).

Kidderminster.- 22nd September. Corporation. Domestic electrical installations in 332 houses on various estates. (See 1st September issue).

Peterborough.- City Council. Electrical installations in 86 houses. (See this issue).

South Africa.- Cape Town.- 27th September. Electricity Department. Supply of 2,000 a.c. single-phase house service meters. (C.R.E. (IB) 63946/50. Ten/1611).*

25th October. 38,000 electric lamps (C.R.E.(IB) 63948/50.Ten/1613).*

29th September. 50 tons of bare copper conductors.(C.R.E.(IB) 63947/50.Ten/1608).*

Southern Rhodesia.- Salisbury. 3rd October. Department of Posts and Telegraphs. 30,000 dry cells (telephone.) (C.R.E.(IB) 63887/50. Ten/1610.)*

* Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank S.W.1 (Victoria 9040)

Stepney.- 7th October. Borough Council. Electrical installations in 145 dwellings. (See this issue).

ORDERS PLACED

Glasgow.- Corporation Water Committee. Switchgear and starters for machinery to be installed in the Castlemilk pumping station. (£4,987 -Allen West & Co., Ltd.

Heanor.- U.D.C. Electrical installation for the stage and auditorium at the town hall. (£465).- Halls (Heanor).

Northumberland. Education Committee. Electrical installation at Stannington County Primary School. (£164).- Fairbairn and Partners, (Newcastle), Ltd.

Tottington.- Lancs. County Council. Electrical installation at Secondary Modern School (£6,507).- S.Dickinson, Ltd.

York.- Corporation Housing Committee. Electrical maintenance on the whole of the Council's housing estates on a price schedule basis.- W.D.H.Mouncy & Son.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

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Aberdeen.- Academy, for E.C.; George Bennett Mitchell and Sons, architects, 1, West Craibstone St.

Aberystwyth.- Rebuilding Welsh National Library; Adams, Holden and Pearson, architects, University of London, W.C.1.

Alnwick.- R.C.School (£40,000);

T.J.Cahill, architect, Lloyds Bank Chambers.

Basingstoke.- Dwellings (51), Moat Close, Bramley, for R.D.C.; Wallis & Smith, architects, 6a London Street.

Bexleyheath.- Houses (58), Faygate Close Estate, for T.C.; borough surveyor, West Lodge, Broadway.

Bradford.- Infants' School at Eccleshill for E.C.; Leedsford, Ltd, Idle.

Bury St. Edmunds.- Rebuilding at West Suffolk Hospital; East Anglian Regional Hospital Board, 33, Parkside Cambridge.

Cambridge.- Erection of buildings for University authorities; J.M.Easton, architect, 54, Bedford Sq., London, W.C.1.

Carlisle.- Flats (44) at Chertsey Estate for T.C.; direct labour (£41,440).

Chester.- Factory, Sealand Trading Estate; Chester Metal Works Co. Ltd., 41, Overleigh Road, Handbridge.

Cookstown.- Factory, Burn Road for Daintyfit Brassiere Co., Ltd., Cosgrove & Rooney, architects, Molesworth Street.

Corby.- Junior school for C.C.; Holtons Ltd., 44, Kettering Road, Northampton.

Coryton.- New oil refinery at Coryton, near Stanford-le-Hope; Cory Bros. and Co., Ltd. (now taken over by Socony-Vacuum Oil Co.)

Duedraeth.- Houses (58), Adwyddu site, for R.D.C.; M.T.Pritchard, architect, Blaenau Festiniog.

Dudley.- Omnibus depot, Birmingham Street; F.H.Gibbons, borough surveyor, Council House.

Eastbourne.- 12 flats at Firle Street and 52 houses at Brodrick Rd. for T.C.; borough engineer.

Esher.- Dwellings (78) Cranbrook Drive Estate, for U.D.C.; surveyor.

Exeter.- Warehouse; Joseph Rank Ltd., 107, Leadenhall Street, E.C.3.

Gwyrfai.- Factory at Penygroes for R.D.C. (£50,000); architects, R. & D. Hall, Bangor.

Ilford.- Houses (35), garages, seven shops, workshops and office, Billet Road and Padnall Road; Edward Meredith & Partners, 6, Victoria House, High Road, Goodmayes.

Block of shops and flats 342/48, Cranbrook Road; A.J.Fowles, architect, 7, Burlescombe Road, Thorpe Bay.

Works extensions; C.J.Whilems, Ltd., Forest Road.

Extensions to factory, Goodmayes Road; L.A.Culliford & Partners, architects, 47, Essex Street, W.C.2.

Kettering.- Junior and infants' school for C.C.; F.Hickman & Co., Ltd., Caxton St., Market Harborough.

Leicester.- Infants' and junior school, Whitehall Road, for T.C.; J.H.Lloyd Owen, architect, 10, Loseby Lane.

Liverpool.- Hospital at Greaves Hall, Southport; architect to Regional Hospital Board, T.N.Mitchell, Alder Hey Hospital.

London.- Edmonton.- Drill Hall and offices, Gt. Cambridge Road; Middlesex T.A. & A.F. Association, 59, Green Street, W.1.

Fulham.- Dwellings (43), Pane Street; Fulham Housing Improvement Society Ltd., 91, Dawes Road, S.W.6.

New Cross.- 20 flats, Malpas Rd., for Deptford B.C.; H.V.Ashley & Winton Newman, architects, 3, Verulam Buildings, Gray's Inn, W.C.1.

South Kensington.- Library at Natural History Museum; Whyatt (Builders), Ltd., Ravenstone St., S.W.12.

Manchester.- Extensions at University; architects J.W.Beaumont & Sons, Danlee Buildings, Spring Gardens.

Middlesbrough.- Houses (92) on the Holmwood site for the T.C.; Middlesbrough and District Building Trades Association, contractors.

Newry.- Houses (120) Dromalane Road, for U.D.C.; K.J.Kenny, architect, Town Hall.

Northallerton.- Houses (70), Crescent and Central Drive Estates, for U.D.C.; surveyor, U.D.C.

Peterhead.- Government office buildings; J.W.Stewart & Sons, 22, Queen Street, Coupar Angus.

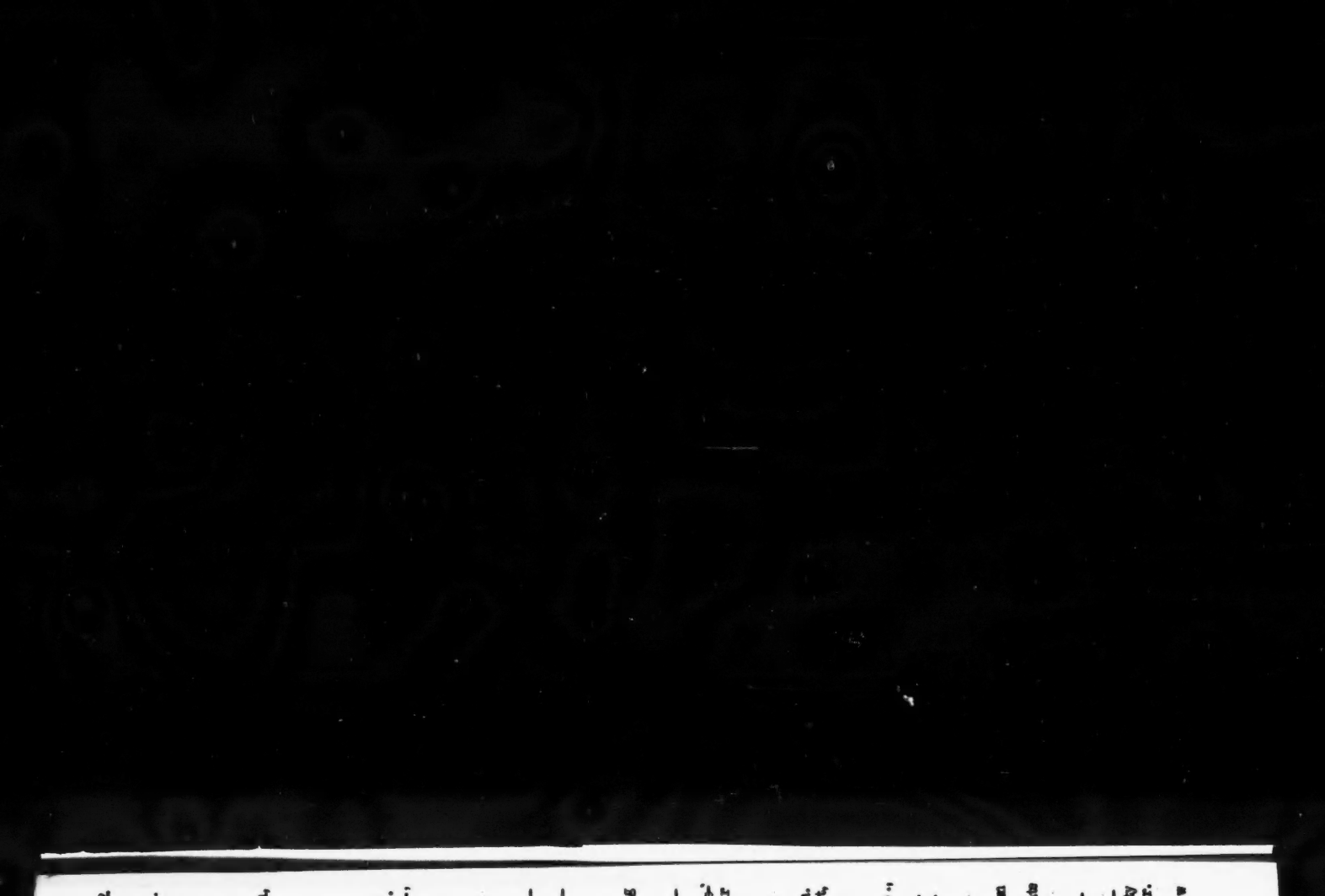
Scunthorpe.- School at Priory Ln. for C.C. (£40,506); Betts & Newbert, Ltd., Scunthorpe.

Sheffield.- Departmental store for Marks & Spencer; architects, Norman Jones, Son & Rigby, Lord St., Southport.

Stafford.- Flats (54), Corporation Street, for T.C.; borough engineer.

Stockport.- Extensions at Stepping Hill Hospital; architects, Harry S. Fairhurst & Sons, 55, Brown St., Manchester.

Houses (66) at Brinnington Estate for B.C.: J.Foulkes & Son.

Wellingborough.- Junior school for C.C.; R.C.Tann, Ltd., Irthlingborough Road. Finedon.

Worthing.- Health Service Occupation Centre, Brougham Road; county architect, County Hall, Chichester.